This Week in The Iron Age

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The Iron Age

SEPT. 26, 1940

ESTABLISHED 1855

The Girl He Left Behind Him

FIFTY-TWO times a year this page is primarily addressed to readers. There are quite a number of advertisers among them, of course, because we reach a great many executives whose firms advertise their products and who have considerable to say in determining promotion and publicity policies.

This being leap year, we have 53 issues of The Iron Age instead of the usual 52, and I am going to take advantage of the extra page to talk purely about advertising. For with all of this munitions work going on, the question is sometimes asked: "Why and what should we advertise if we cannot fill orders?"

Now, what does the word "advertise" mean? You would probably get a hundred different answers from a hundred different people. Perhaps the best way to define it is to say what it is intended to do. So far as I have observed, the function of advertising is to get people to want what you make and to keep them wanting it. And the latter is especially important when you cannot satisfy your normal customers in these abnormal times.

It reminds me of the story of the young soldier who was called to war and was obliged to leave his sweetheart for an indefinite time. You remember, "The Girl I Left Behind Me."

The boy who went to war was very much in love with the girl he left behind him. And she with him. But she was a beautiful girl who had many admirers. And our young friend was too wise to believe in the old proverb: "Absence makes the heart grow fonder." He knew that the modern version was that his absence would make the other guys grow fonder, and the girl, perhaps, less fond.

Our hero resolved that after all of the effort and time that he had spent in winning his sweetheart's affections and his place as No. 1 man, he would not let his rivals win by default through his absence. No, indeed, he would see to it that she was reminded of him often and of the good times that they had had together and the better times that they could have after the war was over.

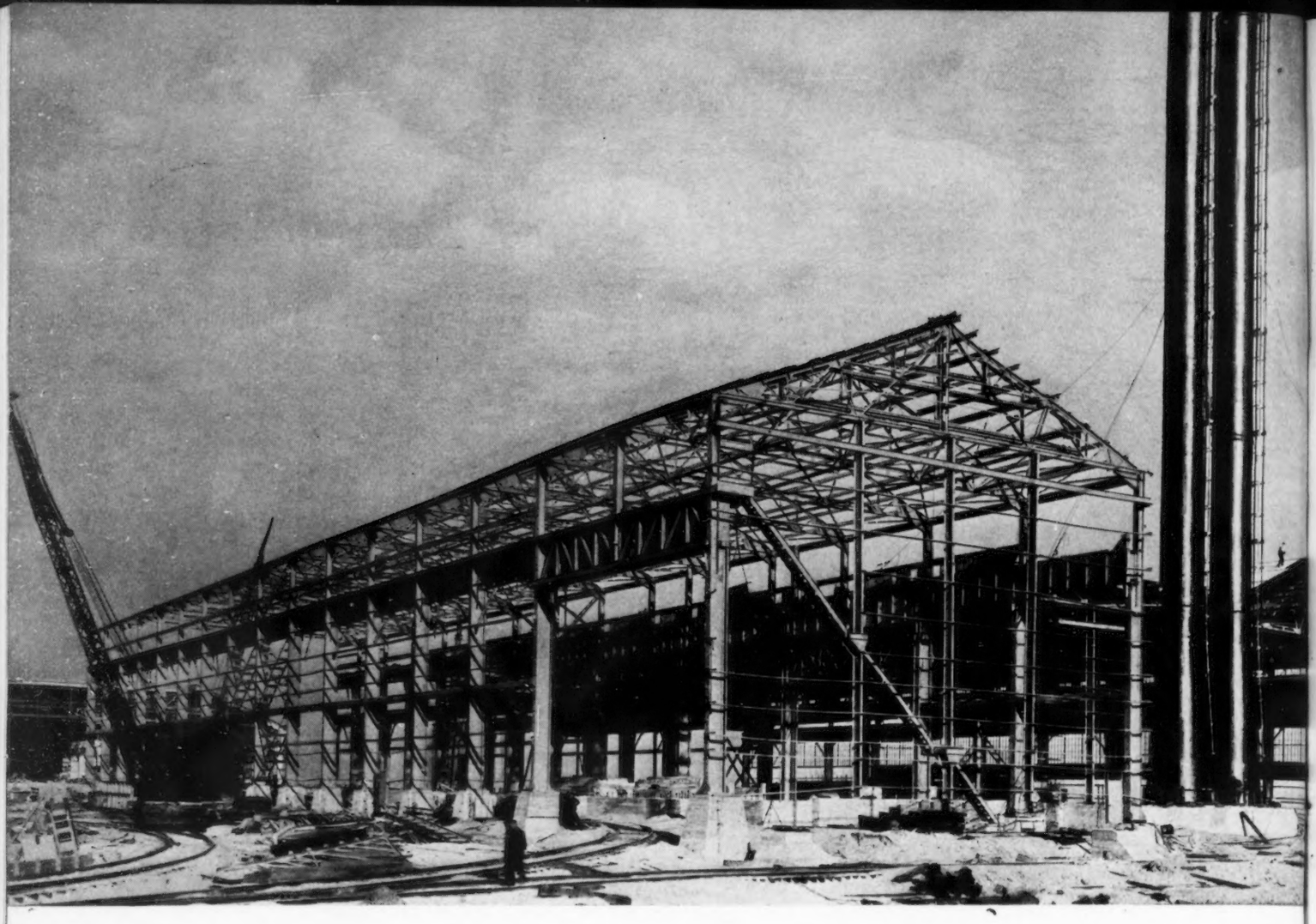
So the boy who left the girl behind inaugurated and carried out a campaign of promotion to keep from becoming the forgotten man. Sometimes when there wasn't much activity aside from drills, he was hard put to it to find interesting things to talk about, but he could always tell her how much he missed her, how much he loved her and how much he wanted to be with her again.

And boys, believe me that letter that she got from him every week or two kept her thinking about him and kept her from thinking too much about the temporary beaux who took her out in the meantime.

Perhaps, you will find a moral in this with respect to advertising under present-day conditions. For certainly, your biggest promotion job today, when you are called to war work, is to make people keep on wanting what you make, whether or not they can get it. And to keep them wanting it until you are ready to give it to them.

It's hard to forget some one that you're made to remember!

J. H. Van Deventer



An Opportunity for Fabricators to *Increase* Sales!

Manufacturers of machine tools long ago adopted the sound selling practice of proving to their customers that machine tools of new designs make better products at lower costs. The reward for these alert and untiring sales efforts has been a vastly greater volume of machine tool orders.

Fabricators of structural steel can take that page from the machine tool industry's "success book." Never before have fabricators had so many good arguments, including low interest rates, with which to get new business. Thousands of manufacturing plants are doing business in buildings which are a handicap to efficient manufacturing. Today the industrial architect, contractor and fabricator do far more than simply build. They can make structures that are really "tools" for manufacturing, tools that will give the manufacturer a valuable advantage in lowered costs and higher profits.

Yet, thousands of manufacturers are not fully aware of these facts. Many are struggling along in outmoded structures that are a definite business handicap. Fabricators who will step out and sell structures in which better products can be made at lower cost will open a new realm of opportunity. Inland engineers are especially equipped by many years of practical experience to give fabricators valuable engineering assistance. It is free for the asking.

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INLAND STRUCTURAL STEEL

Adhesion of Nickel Deposits

By E. J. ROEHL

Research Laboratory, International Nickel Co., Bayonne, N. J.

THE Ollard adhesion test is used to evaluate the efficiency of various etching methods in the preparation of several basis metals prior to nickel plating. Also a study of the Ollard test procedure has shown that by a suitable choice of exact dimensions in the test piece and apparatus, adhesion values can be obtained which represent a closer approach to tensile separation of deposit and basis metal than that obtained in the original Ollard test, both from practical and theoretical viewpoints.

Satisfactory etching methods for preparing the following basis metals are demonstrated herein: high and low-carbon steels, cast iron, wrought iron, composite surfaces of nickel and steel, and nickel itself. Satisfactory etching methods also are given for Ni-Mo steel and Ni-Mo cast iron.

With a steel base, adhesion greater than the tensile strength of the electrodeposit was observed, and with cast iron the break takes place in the basis metal. Perfect adhesion of nickel on nickel is exemplified by continuation of the basis metal structure in the deposit itself.

OF the various tests which have been devised to determine quantitatively the degree of adhesion of electrodeposits to basis metals, the method due to Ollard[1] and applied by Hothersall[2] is the most satisfactory. The present paper describes a refinement of Ollard's test by more closely defining the dimensions of the test piece so that when the deposit and basis metal are separated, the break occurs more nearly by tensile separation. By means of Ollard's method a study has been made of various basis metal cleaning treatments, in order to evaluate their efficiency and to provide treatments which will ensure high adhesion of nickel deposits, both hard and soft, to a number of basis metals. The basis metals studied are: high and low-carbon steels, cast and wrought iron, composite nickel and steel surfaces, nickel itself, copper, Ni-Mo steel and Ni-Mo cast iron.

The problem of the adhesion of deposit to basis metal is one of primary importance in all types of plating, but in the field of heavy nickel deposits for the building up of worn or mismachined parts and for the protection of parts against combined wear and corrosion, good adhesion is a first requisite. The deposits are often ground or machined to size, or may be used as bearing surfaces, and thus subjected to high stress. Since these parts rarely have as their primary object the production of an attractively appearing surface, cleaning methods may be employed which would be out of the question for decorative work. The hardness of nickel electrodeposits can be varied, depending upon the plating conditions, from 160 to 500 Vickers, and thus provide a wide scope for various engineering purposes.

The Ollard Test

Fig. 1 shows the various steps in the Ollard test method. A machined test piece 1.00-in. in diameter by 1.50-in. long is fitted with a connecting wire; the whole specimen is stopped off with Halowax and the wax then removed from a portion of the surface as indicated in A. The piece is cleaned by the method it is desired to study and an electrodeposit approximately 0.10 in. thick formed on the exposed end. The wax is then removed and the

[1] Ollard: "Adhesion of Deposited Nickel to Base Metal," Trans. Faraday Soc. *21*, 81 (1925).

[2] Hothersall: "The Adhesion of Electrodeposited Coatings to Steel," Trans. Electrochem. Soc. *64*, 69 (1933).

FIG. 1—Various steps in the Ollard test method. About ¾ actual size.

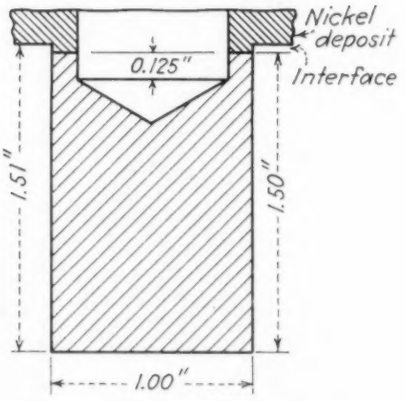


FIG. 2—Cross-section of Ollard test specimen.

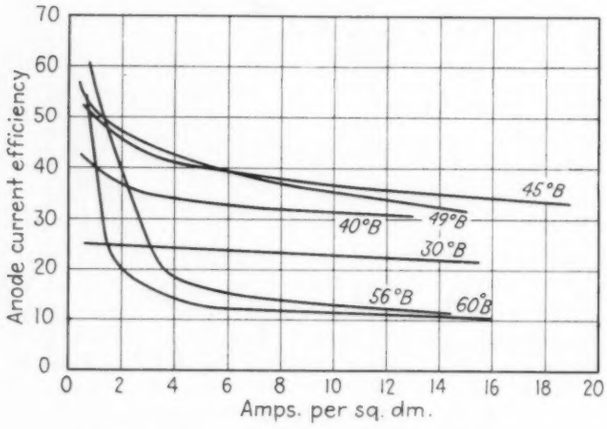


FIG. 3—Corrosion of iron anode in H_2SO_4 solutions.

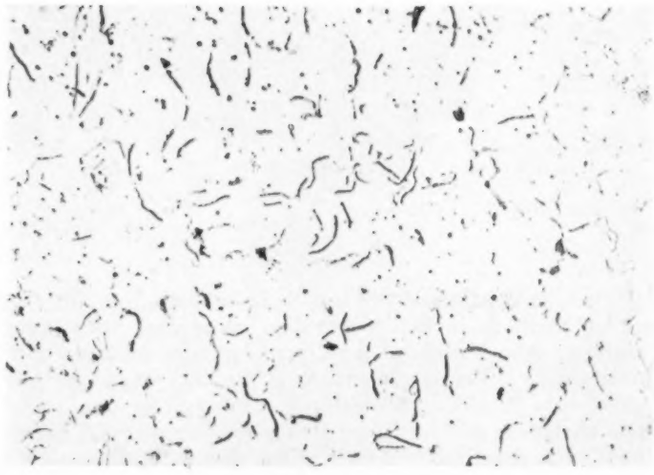


FIG. 4—Cast iron with well distributed carbon, in direction parallel to deposit. Unetched. At 100 diameters.

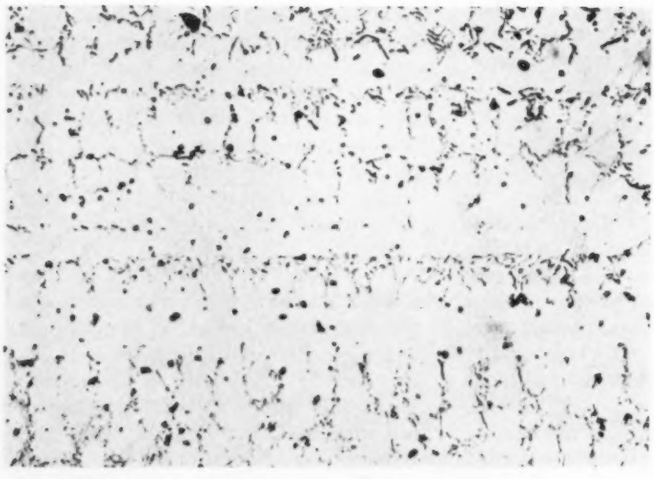


FIG. 5—Cast iron with poorly distributed carbon, in direction parallel to deposit. Unetched. At 100 diameters.

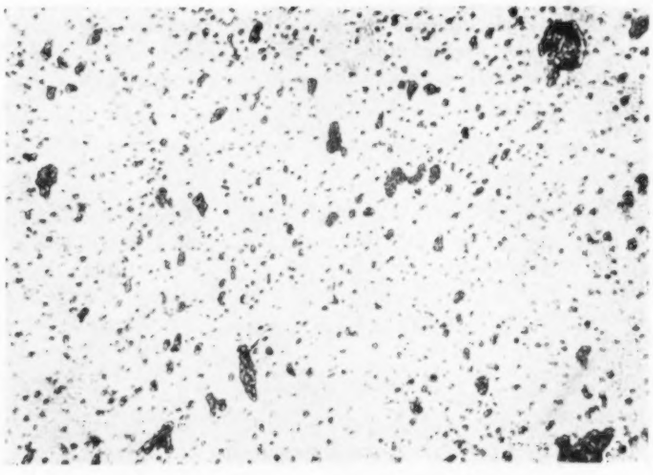


FIG. 6—Wrought iron in direction parallel to deposit. Unetched. At 100 diameters.

piece machined to give a total length of 1.51 in. from the unplated end to the under side of the nickel deposit; that is, 0.01 in. of nickel is machined off so that no nickel will remain on the cylindrical surface of the test piece itself and the interface between nickel and basis metal will be well below the shoulder of the finished specimen. At the same time a hole ¾ in. in diameter by about ⅜ in. in depth is drilled through the nickel and basis metal, as indicated in B. The test piece is then supported in the die C and a load applied by means of a rod in a tensile machine. D indicates the appearance of the test piece after the nickel ring has been forced off. From the value of the load and the area of contact between deposits and basis metal, the adhesion in terms of lb. per sq. in. can be calculated.

Fig. 2 is a cross-section of a test specimen just prior to breaking in the tensile machine.

Study of Adhesion

The most important factor in obtaining good adhesion is adequate cleaning and preparation of the surface of the basis metal. The surface must be chemically clean and for maximum adhesion, where the values are of the same order of magnitude as the tensile strength of the basis metal, the weak distorted surface layer formed in polishing must be removed by etching.

In order to study the efficiency of various cleaning procedures, a number of samples of steel, cast and wrought iron were prepared and tested for adhesion by Ollard's method. The procedure shown in Table I was followed.

The first action of the anodic etch probably is to remove the polished layer and expose the crystal structure, after which the work goes passive and gasses. During the first stage of the treatment the anode efficiency of the dissolving iron is quite low as can be seen in Fig. 3, taken from the work of Salauze,[4] where the anode current density is plotted against the anode efficiency for iron in H_2SO_4 solutions of varying concentrations. (25 per cent H_2SO_4 by weight is equivalent to 22° Be.) Some gassing will thus occur during this period, and a black film is left on the surface. It is necessary to remove this film (it probably was not removed in method 5 in Table II) in order to secure good adhesion and this is accomplished during the second stage of the treatment when vigorous gassing occurs—at a point

[3] McLare: "The Repair of Worn Components by Electrodeposition," Met. Ind. (L) 24, 521 (1924).

[4] Salauze: "Traite de Galvanoplastie," p. 240 (1935).

TABLE I

Procedure Followed to Prepare Specimens for Adhesion Test

Plating Bath:

$NiSO_4.7\ H_2O$	330 gm. per liter
$NiCl_2.6\ H_2O$	30 gm. per liter
H_3BO_3	30 gm. per liter
130 deg. F., pH 2.0 (electrometric)	50 amp. per sq. ft.
Deposit hardness	160 Vickers

Test Piece Dimensions:

Deposit thickness	0.070 to 0.10 in.
1.030 in. hole diameter in die	
Duplicate runs in all cases	

Preliminary Cleaning Treatment:

Pumice scrub and cold water rinse.
Cathodic alkaline treatment for 2 min. at 100 amp. per sq. ft., 140 deg. F., solution composed of 8 gm. per liter NaOH, 1.06 gm. per liter Na_2CO_3.
Pumice scrub and cold water rinse.
Cathodic alkaline treatment for ½ min.
Cold water rinse.
This procedure was then followed by the various etching treatments indicated in Table II, then by a cold water rinse, after which they were placed in the plating bath with the electrical connections made.

TABLE II

Etching Treatments and Adhesion Values, Using the Original Ollard Test. Steel Basis Metal.

Etching Treatment	Ollard Test Values (Lb. Per Sq. In.) Drill Rod (0.97 C.)	Mild Steel (0.20 C.)
(1) Simple immersion in 15 per cent HCl (by weight) 140 deg. F., 2 min.	6,300	5,200
(2) Anodic, 25 per cent H_2SO_4 (by weight), 20 amp. per sq. ft., room temperature, 10 min. Increase current density to 200 amp. per sq. ft., for 2 min. Cathodic for 2 to 3 sec.	16,000	22,500
(3) Anodic, 25 per cent H_2SO_4 (by weight), 200 amp. per sq. ft., room temperature, 2 min. Cathodic for 2 to 3 sec.	7,500	....
(4) Anodic, 25 per cent H_2SO_4 (by weight), 200 amp. per sq. ft., room temperature,		
1 min.	12,200	....
2 min.	16,000	13,000
3 min.	18,000	15,500
4 min.	....	18,000
(5) Anodic, 67 per cent H_2SO_4 (by weight), 100 amp. per sq. ft., room temperature, 20 sec.	No adhesion	
(6) Method of McLare.[3] Anodic, 25 per cent H_2SO_4 (by weight), 100 amp. per sq. ft., room temperature, for 20 sec., after oxygen is first evolved	18,000	8,500

TABLE III

Etching Treatments and Adhesion Values, Using the Original Ollard Test. Cast and Wrought Iron.

Basis Metal	Etching Treatment	Ollard Test Values, Lb. Per Sq. In.
Cast iron with well-distributed carbon (Fig. 4)	(1) 100 amp. per sq. ft. Removed as soon as gassing started (1½ min.)	985
	(2) 100 amp. per sq. ft. Allowed to gas for 1 min.	20,000
	(3) 100 amp. per sq. ft. Total time 5 min.—gassed for 1½ min.	20,000
	(4) 200 amp. per sq. ft. 4 min.	4,160
	(5) 200 amp. per sq. ft. 6 min.	16,900
	(6) 400 amp. per sq. ft. 4 min.	13,000
	(7) 400 amp. per sq. ft. 6 min.	12,500
Cast iron with poorly distributed carbon (Fig. 5)	(8) 100 amp. per sq. ft. 5 min.	15,000
Wrought iron with slag inclusions (Fig. 6)	(9) 100 amp. per sq. ft. 5 min.	13,800

FIG. 8—Cast iron. Extent of etching with No. 5 treatment. At 100 diameters.

LEFT

FIG. 7—Cast iron specimen after break. Twice actual size.

during this stage the film is lifted, almost in one piece, leaving a bright surface in the case of mild steel and a generally rather darker one for high carbon steel.

The cleaning treatment in all of the following cases consisted, after the same preliminary procedure as employed for steel, of an anodic etch in 25 per cent H_2SO_4 (by weight) at room temperature. Results are given in Table III.

Fig. 7 shows the specimen obtained under treatment No. 2. It can be seen that the break occurred entirely in the cast iron. Fig. 8 shows the extent to which etching of the basis metal occurred under treatment No. 5.

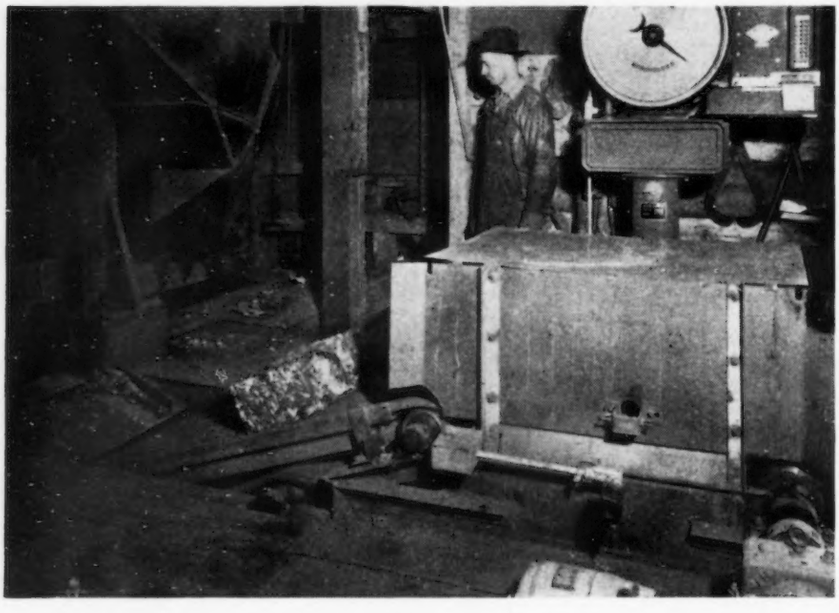
Ed. Note: Next week the author concludes his report on this interesting investigation.

Handling Scrap Metal Efficiently

THE problem of handling waste metal materials resulting from processing of parts in the machine shop, is one that often proves to be a real headache to many a plant.

How one manufacturing concern has solved this problem is interesting. This particular company has a lot of scrap tin to contend with. Two things are done. First they put it through a heating furnace where all the tin is reclaimed, and second the scrap is put through a shredder and then pressed into bales about 18x15 in. in size. Each bale is pressed under 300 tons pressure and weighs about 200 lb. The bales of scrap then go back to the steel mills.

In handling this material, one of the most serious problems was that of weighing the bales. As the operators are paid on a tonnage basis, it was important that each bale be weighed quickly and accurately. A dial scale with printer and operated by means of an electric eye finally operated to the satisfaction of both labor and management.



As the accompanying picture shows, a Fairbanks dial scale with chart graduated 500 lb. by 1 lb. and without tare or capacity beams, was installed. It is equipped with a Printomatic with time clock, one bank of letters, one bank of numbers and one bank of special symbols. The printer attachment is equipped with double roll tape. A section of roller conveyor is mounted on the scale platform while an endless belt 9 ft. long and 36 in. wide passes over the scale platform and underneath the scale box. The belt speed is about 12 ft. per min.

As the bale comes from the press and drops onto the moving belt, it is carried across the scale platform. Then at the instant the bale passes over center of the platform, it intercepts the beam from the photo-electric tube. This automatically trips the printing mechanism and prints the weight.

The Printomatic is set to weigh a bale of scrap metal about every 20 sec.

Milling Machine Manufacture

—in the modern manner. Kearney & Trecker institutes a production line basis and in less than a year increases production 140 per cent, personnel 87 per cent and area 41 per cent.

By ROBERT BINGHAM

AFTER eight months of unrelenting effort, the Kearney & Trecker Corp., Milwaukee, World's largest exclusive manufacturer of milling machines, has realized a goal, which, when visualized in December, 1939, seemed as distant as the moon, and nearly as difficult to attain.

In that period, the company has increased production by 140 per cent, personnel by 87 per cent, and plant area by 41 per cent.

Furthermore, the new plant which made possible this tremendous boost in output is, so far as is known, the only plant in the world where machine tools are manufactured and assembled on a production line basis similar to that employed by the automobile industry, differing mainly in that no moving lines or conveyors are used. One of the first to receive volume orders for identical machines, K. & T., was able to revamp its old plant to blend in with the new on a production line system because of this unprecedented demand for milling machines from abroad and at home.

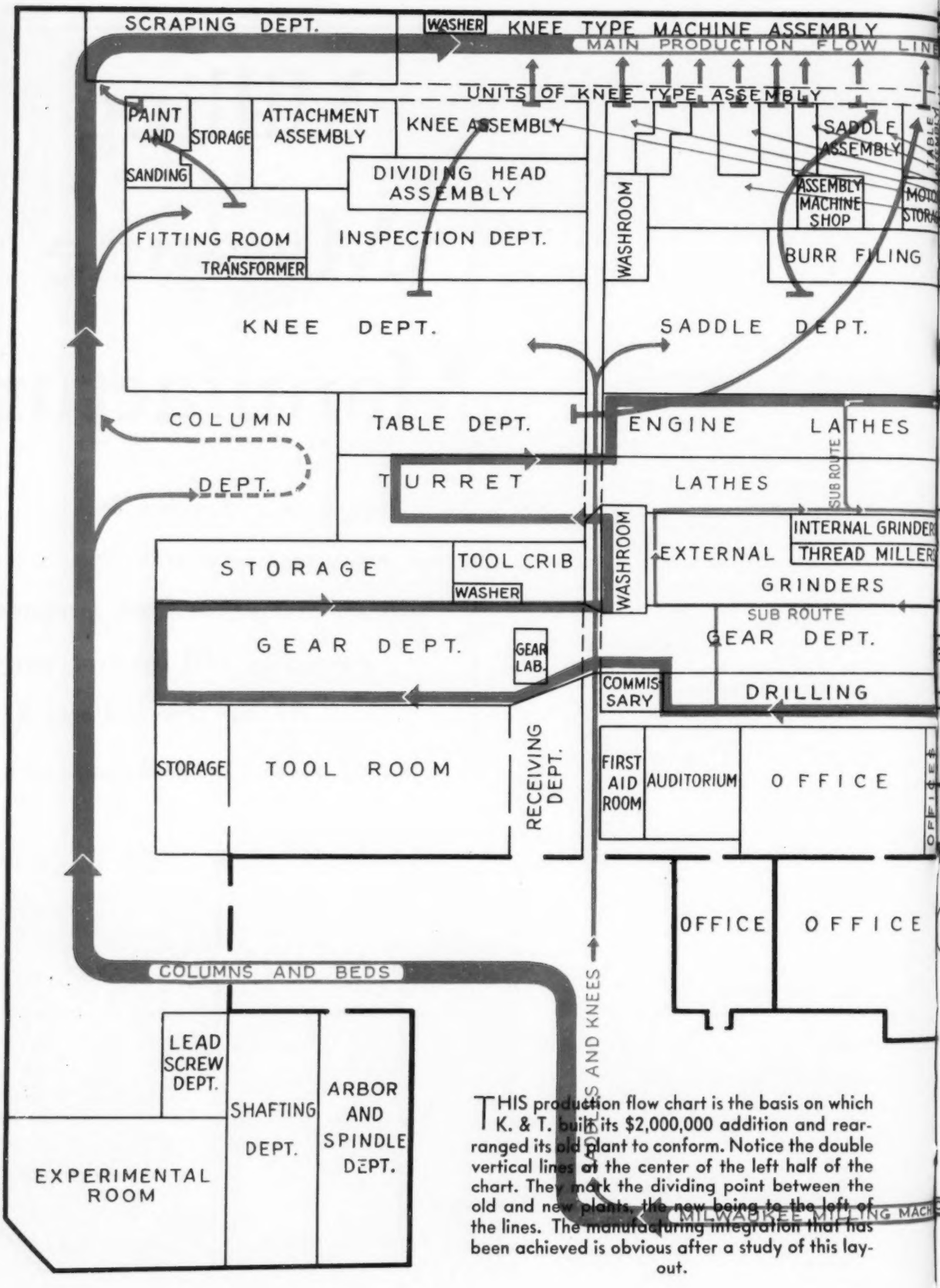
The great problem that faced the management in its decision so to convert its plant was how to achieve production line advantages without sacrificing at the same time the flexibility of manufacture that is called for by a line that includes over 140 varieties of bed and knee type milling machines, all differing in principal characteristics.

The objective was, and is, to manufacture not milling machines, but components such as columns, knees, tables, pulley brackets, and so on, and then to assemble these components into the size and type machine specified by the customer. The first task, therefore, was to increase the production of these components, which in December, 1939, were being made at the rate of about 2500 monthly. A goal of 6000 components a month was set up, and in August, 1940, this figure was reached—this after an expenditure of some $2,000,000, the hiring of nearly 1300 persons and the purchase of 227 machine tools and other necessary equipment.

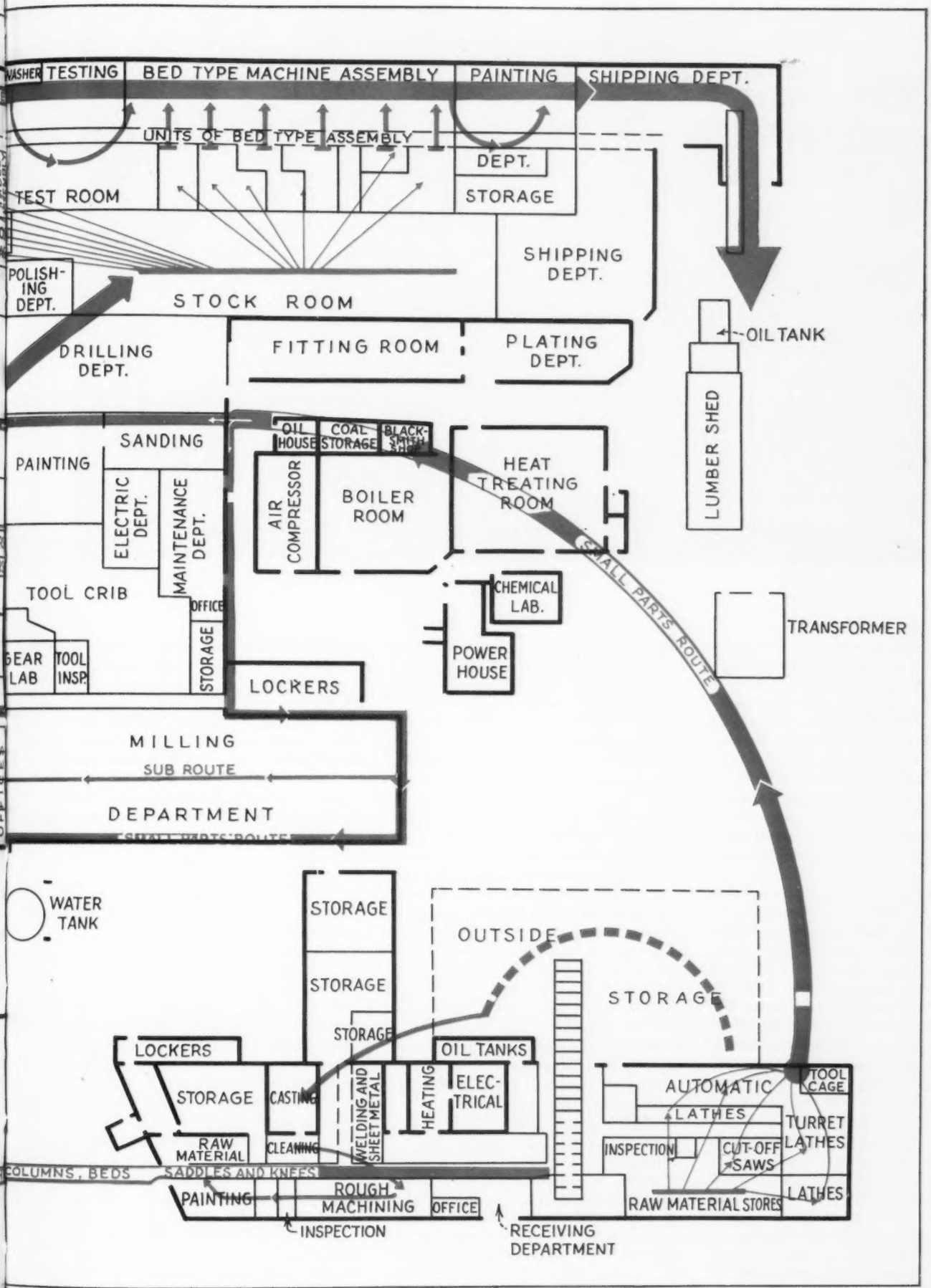
Yet, with all this high production planning, the shop still retains its flexibility. Unlike some production lines where each machine and each man has a set fixed quota and job for which responsibility is assigned, each department at K. & T. has certain machines which are capable of producing in excess of the demands placed upon them. When their work is finished they are then available as a reserve in case bottlenecks develop elsewhere in the plant on similar machines. In some plants, a bottleneck slows down and sometimes stops work throughout the shop, but at K. & T. a bottleneck can usually be remedied by transferring work to a reserve machine located elsewhere, sometimes in an entirely unrelated department.

Also, when demand for one type milling machine far exceeds that for another, and the consequent need for certain components is greater than for others, work can be transferred from those machines that are crowded to those whose regular work is on components not in demand at the moment. The number of components varies as much as 50 per cent with the different machines in the K. & T. line.

Although the theory of the new plant calls for routing all components through the stock room to the assembly line, in actual practice today many components go directly from manufacturing into assembly. Under less active production conditions, when manufacturing schedules cannot be made up



THIS production flow chart is the basis on which K. & T. built its $2,000,000 addition and rearranged its old plant to conform. Notice the double vertical lines at the center of the left half of the chart. They mark the dividing point between the old and new plants, the new being to the left of the lines. The manufacturing integration that has been achieved is obvious after a study of this layout.


WASHER
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UNITS OF BED TYPE ASSEMBLY
DEPT.
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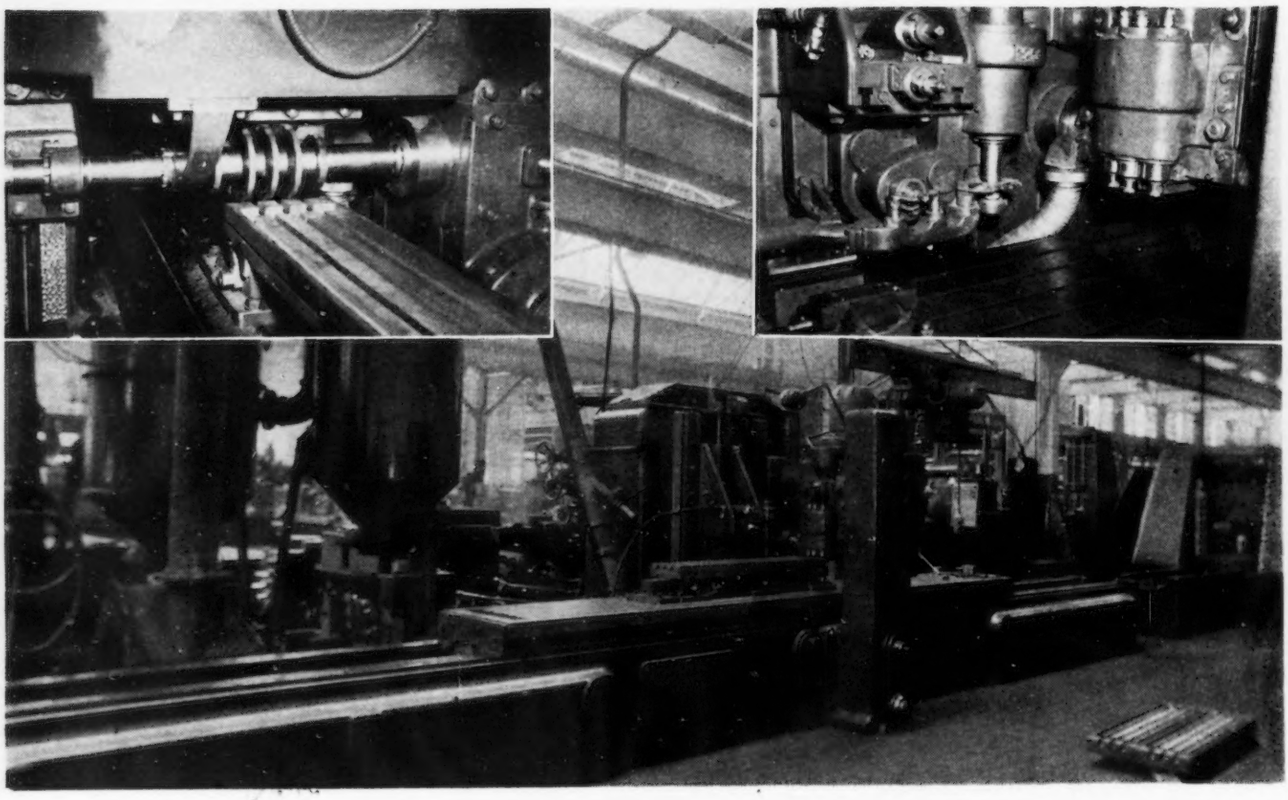
INSPECTION
RECEIVING DEPARTMENT



FULL view of the special T-slot milling machine designed and built by K. & T. for its own use. The tanks at left are part of the chip exhaust system. Insert upper left—these three gashing cutters precede the T-slot cutters shown on insert to the right. Separating the two are three exhaust inlets which capture the gashing chips before the T-slotters enter the cut. The extremely close fit of the T-slot cutters necessitates the elimination of all chips. Also shown in the insert at upper right are the two tiny exhaust pipes that suck the chips away from the side T-slot cutter.

months in advance as today, the base components which go into every milling machine, regardless of type or size, would be made up according to a prearranged inventory plan. From that point on the various components which go to make one machine different from another would be ordered from stock according to consumer requirements. At no time are milling machines assembled for stock. Only the components are stocked, and they only up to a certain point.

On Dec. 20, 1939, ground was broken for a 70,000 sq. ft. addition to the old plant which comprised 220,000 sq. ft. Employees at that time numbered 1506 and production of componets was approximately 2500 a month. A mere 44 days thereafter the first machine tool was installed in the new structure and placed in operation. On Feb. 20, a high production precision gear line which turns out 480,000 gears of 2100 different types annually started up.

Even before this expansion had been completed, it became apparent that more room would be needed, and a further addition of 20,000 sq. ft. was begun.

Much of the credit for bringing the new plant to successful completion so rapidly was due to the cooperation of other machine tool builders. Since

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most of the 200 new machines ordered were individually motor driven, they were placed in production as soon as they reached the shop floor.

Nearly all of the 450 machine tools in the old plant were moved and rearranged to coincide with the production plan set up for the new building. When all this moving was completed, the old and new plants had been blended together perfectly, into an integrated unit, which entirely reversed the management's former conception of manufacturing.

The old plant had been arranged in departments by types of machine tools. To mill the front face and front edge of the knee casting required transportation of the knee to the milling machine department. When holes were drilled, bored and reamed, the knee would travel either to the radial drill department or to the boring bar section, and so on through the various operations.

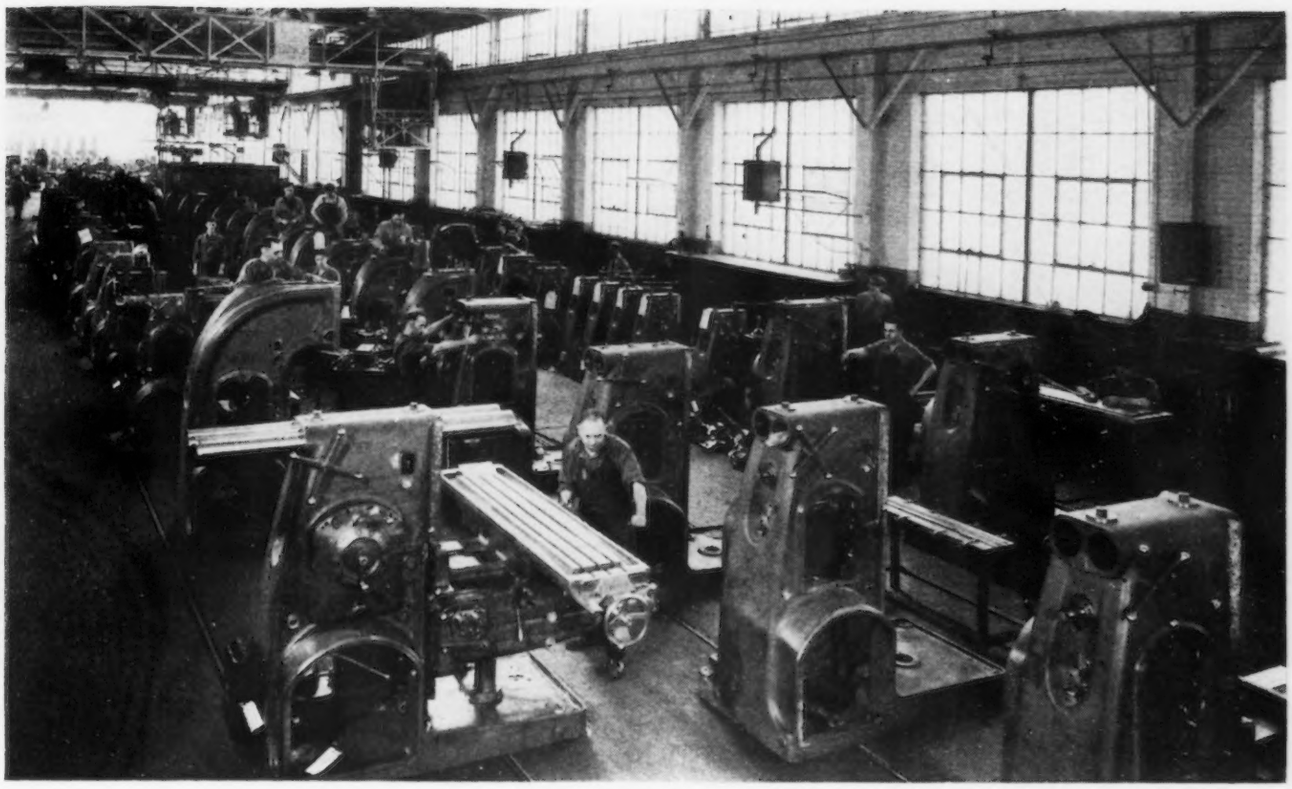
Arrangement of New Plant

The new setup includes in one department wherever possible all the machining equipment incident to the manufacture of an individual piece or part. Thus the knee department today is the locale of more than 40 separate operations on the knee casting which starts through just as it comes from the cleaning and priming department. Included in the knee department are two types of planers, three types of milling machines, radial drills, and three types of boring bars.

For the manufacture of small parts, some machine tool departments still exist, such as turret lathes, grinders, drilling, thread millers, etc.

Over 200 Machines Ordered

So that this system could properly be put into execution, more than 200 machine tools were ordered, thus ex-



PORTION of the main assembly section for knee-type machines.

emplifying the old saying that the machine tool industry is one of its own best customers. Included were 37 lathes of various types, 17 boring bars and boring mills, 20 drills, radial and sensitive, 13 automatics, 15 machines for gear cutting and testing, 32 varied milling machines, 31 types of grinders, 16 small straightening presses, 6 planers, and 10 woodworking machines.

Additional equipment included a heat treating furnace, 3 complete spray booths, a shot blast room, 17 cranes, 6 electric hoists and 3 electric trucks.

With the equipment ordered, the next big problem was to obtain the personnel to operate the machines, and to staff the plant generally. As a preliminary figure, an increase of about 600 men, or roughly 40 per cent over the Dec. 1, 1939, total was contemplated. When the 600 workers had been hired, the doors to the employment department remained open and today they are still open, though nearly 1300 persons have been taken on, nearly as many as were employed in all of the old plant.

In an industrial city such as Milwaukee, in busy times it is impossible to hire 1300 skilled workers. Yet K. & T. had to have machine operators and erectors for the assembly lines, so the management took matters into its

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own hands and solved the enigma in a novel and expensive, but effective manner. Modern machine tools, the executives reasoned, are either fully or semi-automatic. After a little practice any dependable man with common sense and the ability to learn should be able to acquire skill, they said. For several weeks, therefore, while new equipment was being ordered, 579 semi- and unskilled workers stood alongside veteran employees watching and learning the operations that they would be called upon to perform by themselves later. Of these, 185 were classified as special learners and 394 as helpers. Many of the latter were hired for the scraping and chipping departments.

Trained Own Skilled Labor

Thus it was that when the machines finally arrived, the fledgling machinists definitely advanced by now to at least a semi-skilled classification, were able to feel thoroughly at ease at their jobs in only a few hours' time, and to begin productive effort almost immediately.

In order to be sure that quality was unaffected by this large increase in new workers, the inspection staff was expanded materially. Today, K. & T. boasts of 80 general shop inspectors, 24 gear inspectors and 24 preliminary and final testers.

Inspection Department Enlarged

Individual inspection sheets for each of the thousands of parts in a milling machine are on file. On these sheets is listed the inspection operations that are to be carried out for each part or piece. After each operation on the manufacturing route sheet, the first completed piece of each lot is inspected, and certain pieces thereafter until 33 1/3 per cent of the lot has been checked. As an example of the multiplicity of inspecting operations, the route sheet for the knee casting carries 52 machining operations, and one-third of the knees in each lot must be inspected after each of these operations.

The final tests to which all machines are subjected are themselves marvels of precision. The test card for a vertical milling machine includes exactly 76 tests, including an actual cutting test at seven feeds on a 190 to 210 brinell test block. Horizontal milling machines are run through 92 tests including the cutting test.

Allowable error does not exceed

0.001 to 0.0005 in. on the various alinement tests made on both the horizontal and vertical types.

The old bugaboo of shortage of skilled labor was utterly disregarded by K. & T., which, in spite of the fact that virtually the entire industry otherwise was complaining of the situation, went out and made its own skilled men. Other plants, of course, have had plans for training unskilled men, but the sight of 579 men, nearly half of all those hired, standing alongside machines and experienced workers, watching, and learning, was one to excite admiration and comment.

Two Plants Like One

Today a stranger to the plant would think the entire structure had been built at the same time, if he judged entirely by the straight line production of parts, flow of material, and assembly. Only by inspecting the roof girders, and flooring, and by comparing the types of construction, can one differentiate between the old and the new. The flow chart, reproduced here, provided the basis on which the two plant were welded into one whole unit as concerns manufacturing.

Basically a milling machine consists of a column, either vertical or horizontal, a knee, a saddle and a table. Consequently the K. & T. rearrangement concentrates into one department as best as can, the various operations on each of these component parts.

From the time a casting comes into the storage yard across the street from the main buildings, its progress is as carefully and accurately charted and checked as a heat of steel en route through the various roughing and finishing mills. K. & T.'s castings, all of which are poured at outside foundries, are first sent to the cleaning and priming department for shot blasting and chipping. The shot blast, with about 100-lb. nozzle pressure, has reduced the amount of time per casting in this department by about half, according to shop officials. In another section of this building many of the small parts are started on their way through the automatic turret lathes, 14 of which are new. Production in this department has increased nearly 100 per cent since the new equipment was installed and shifts increased.

In this building also are stored gear blanks, bar stock and spindle forgings. From here small parts and the large castings pursue different courses until once more they meet on the final assembly line.

The columns, knees and saddles start out together but branch off along the route to individual departments. A typical column undergoes 37 separate operations, 24 of which are performed in the column department proper, after entering the main building. Seven different types of machine tools are used on the columns, but many of these perform more than one operation. In general these include medium and large planers, boring bars, K. & T. special duplex and multiple bars, horizontal knee type milling machines, and radial drills.

To give another example, the small spindle gear, which follows a path of its own in the main building, requires 27 operations, 19 of which are machining. Of the 19, 15 are performed in the gear department proper, and the other four are divided between two other departments. Formerly, these 19 machining operations were spread over five departments, seven being the maximum number in any one department.

As the columns follow their course, they go into the fitting room where various parts are added, and from there into the paint booths, after which the scraping department gets the castings. A degreasing wash, and the casting is ready to enter the main production flow line where both knee type and bed type machines are assembled.

At right angles to the machine assembly line are assembly departments for knees, tables, saddles and dividing heads, all essential components. Small parts are received from the stock room at these assembly points and the components are completely assembled as units before final assembly in the column. Knee assembly, for example, consists of delivering to the knee assembly department, the knee casting, finish machined. The casting is swung onto a metal stand, the lower shelf of which contains all the parts to be assembled into the unit. The parts in turn were assembled in an adjacent aisle. One man assembles the entire knee unit, nearly 8 hr. being required for this wholly hand operation.

Finish assembly is soon completed and after a severe check in the test room, details of which have been discussed, and final painting, the machines are ready for shipment.

Castings and parts throughout the production and assembly lines are moved by 58 traveling cranes and hoists, 4 electric trucks and 3 gas tractors. Small parts are handled by quantities of 2-wheel hand trucks and hand lift trucks. No moving assembly lines or conveyor belts are employed in this plant.

One of K. & T.'s strongest talking points is its precision gear department. About 40,000 gears are produced a month at this plant for its own use, and in the course of a year approximately 2100 different types are made. The new addition called for the installation of 15 new gear cutting machines in the gear line, including generators, shapers, hobbers, lappers, etc. All these were added to the equipment acquired in a $200,000 gear program completed in June last year. Gears are now made almost entirely in the one department, whereas previously a number of transfers around the shop were necessary. The cutting of each gear has thereby been speeded up substantially.

40,000 Precision Gears a Month

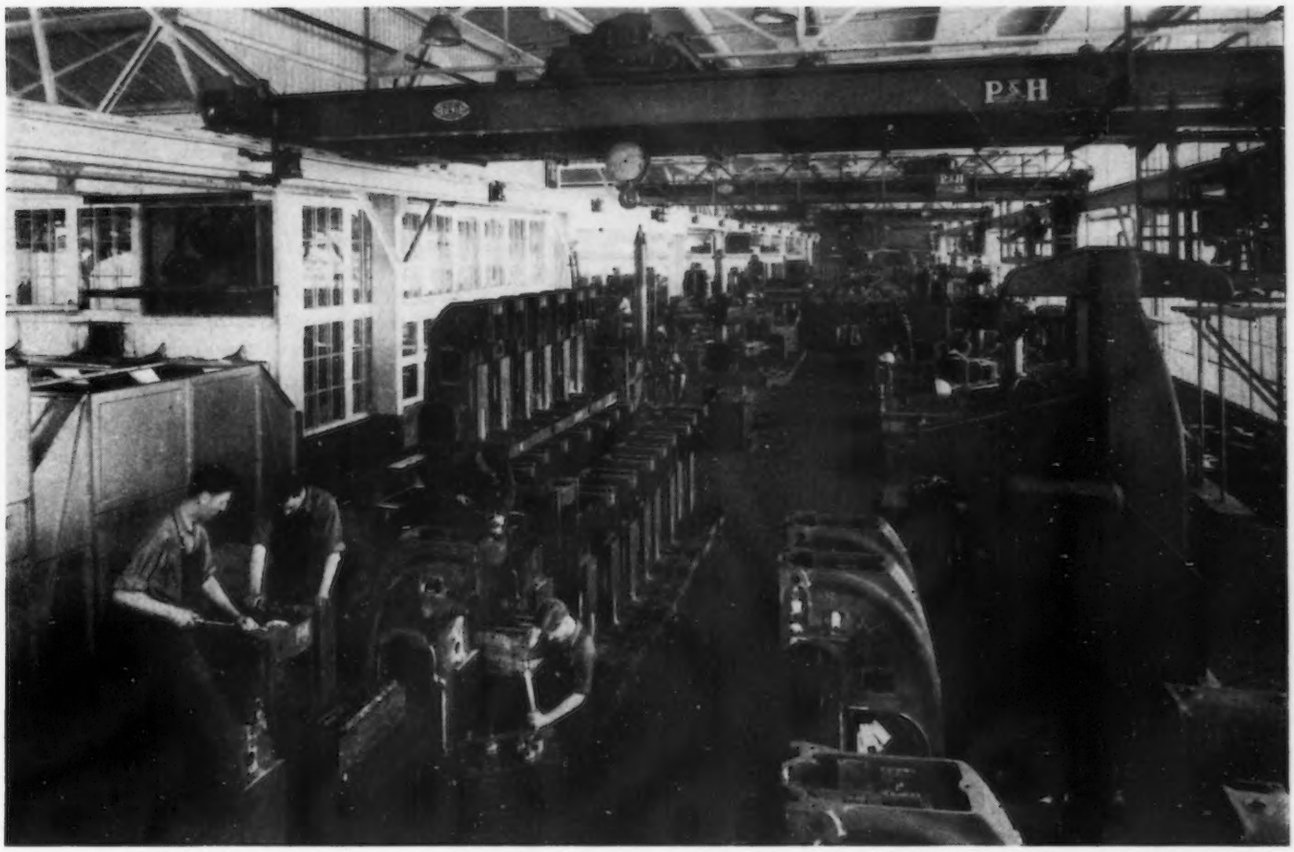
An unusually complete gear testing laboratory complements the production line. Air conditioned, sound proofed and specially illuminated, the gear lab represents the ultimate in gear control. For each of the 800 to 900 gears made for the many models of Milwaukee milling machines, the gear department maintains setup cards. These cards tell the operator the exact operation, arbor or cutter tool, feed, speed, passes, and machine number to be used for the particular gear ordered.

A special gear gasher is outstanding in the gear cutting production line. Designed by company engineers, it consists of a standard milling machine plus a special head and two special hydraulic clamping and indexing fixtures. The teeth in the 12-in. diameter cutter are so spaced that overheating is uncommon even on hard stock. Spindle speeds range from 28 to 35 r.p.m. A 30-in. diameter 1000-lb. flywheel is carried on the spindle and eliminates vibrations from the cutter.

The performance of the gasher is worth close attention. A 21-tooth, 7-pitch pinion which formerly required 16 min. was cut in 90 sec. Only 2½ min. was necessary to complete a former 18 min. job, a 24-tooth 6-pitch pinion.

The gasher is arranged to handle 60 to 70 different types of bevel gears.

Elsewhere in the plant are found other machine tools developed by K. & T. for its own exclusive use. In the table department, for instance, are five special milling machines. The old machining setup on tables consisted of roughing on a slab miller, and finishing on a planer. The new setup calls for the table to go first to a five spindle milling machine, with three vertical and two horizontal spindles. The top and sides of the table are milled in one pass requiring about 15 min. time as



GENERAL view of the column department. New paint and sanding booths are at left. At far end of bay, where canvas is hung, another addition was being constructed when this picture was taken.

against approximately 90 min. time previously. The three vertical spindles are so arranged that a total width of 30 in. can be milled in one pass, though the average table is only 16 in. wide.

The second table operation is performed on another special milling machine with two vertical spindles and one large horizontal spindle, which mills the relief between the dovetails. The two vertical spindles semi-finish the dovetails.

Operation three on the table calls for finish milling of dovetails and bearing surface, and finish milling of sides on another similar special machine.

T-slotting is performed on the next special machine. The standard table has three top slots and two slots in one side. Circular cutters precede the T-slot cutters and gash the slots. Chips are picked up by an exhaust system, nozzles being attached to the spindle head and following the gashing cutter. Nozzles are attached to each side of the horizontal spindle which cuts the side T-slots. The exhaust system removes 11.3 cu. ft. of chips an hr. with a capacity of 825 cu. ft. per min. Since the T-slot cutter shank fits into the gashing cut with only 0.002 in. clearance, all chips must be eliminated.

The top and sides of the tables are ground on standard machines.

A completed table issues from this line about every 45 min., a 75 per cent reduction in time over the old method.

Approximately $2,000,000 was expended by K. & T. on the new buildings, the new equipment and the renovation of the old plant. In addition to realizing more manufacturing space, office space was enlarged and rearranged, a 200 seat auditorium was constructed for plant meetings, sales conferences, etc., first-aid facilities were enlarged, and the experimental room moved and size increased. An artesian well on the plant grounds provides 56 deg. water, which has simplified the job of air conditioning the entire office building.

Quality Finishes for

ONE of the lessons ground into the manufacturer of metal products during the last few hard years is the importance of putting the "right" finish on the "right" product. It has become generally recognized that inherent quality in the product is not enough to make it sell to its fullest market. Every product requires a finish which talks quality in the language which every purchaser understands—eye appeal. In other words, a quality product needs a quality finish.

The word "quality" without close definition leaves both the manufacturer and the purchaser in a quandry. What is a quality finish? Is it an electroplate or a lacquer? Is it chromium or gold? Is it a high polish on clad metal or porcelain enamel?

Difficult as it is to give an exact definition, it may be stated broadly, that the best finish for a metal article is one which will perform the function for which it is intended, protective, decorative, or both, for the intended life of the article.

However, it is not always feasible to provide the "best" finish. In some cases it is most practical to put on a shorter-lived finish and to renew it occasionally. So for example, many plumbing fixtures which are built to last for a decade or more, have a nickel and chromium plate which lasts only from about two to five years. It is cheaper to replate than to put on a "permanent" finish.[1] As a matter of

[1] A notable exception to this practice is the case of some of the finer private dwellings which use gold plated plumbing fixtures and hardware for their appearance, long life and the elimination of polishing and cleaning labor. While the economy of this step may be doubted, it does have definite advantages for a highly selected type of user.

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LEFT

FINISHES for products over a wide cost range. Left—aluminum reflectors finished in Alzac (an electrolytic oxide); right—a cadmium plated cup holder and a paper clip. (Courtesy Philip Sievering, Inc.)

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BELOW

ALUMILITE finish in varied colors on aluminum articles of the "novelty" class. (Courtesy Philip Sievering, Inc.)

Metal Products

By ADOLPH BREGMAN
Consulting Engineer, New York

NINETEENTH in a Series of Articles on the Technical and Economic Aspects of Metal Cleaning and Finishing

fact, in city apartments, it is customary to replate the plumbing fixtures whenever the apartment is re-decorated.

Although the function of a finish may be protective or decorative,[2] in many cases the article may call for both of these purposes, as for example, in the case of electric irons. The finishes commercially available for consumer products, their purposes and characteristics are listed in the accompanying table.

In the cheapest class of articles, for 5c and 10c store sale, the purpose of the finish is either slight protection for utility articles or decoration at very low cost (often imitative of higher priced, quality merchandise) for sales appeal. So, there is bright cadmium plate as imitation chromium; colored lacquer imitating gold; tin plate wiped with drop black to imitate oxidized silver; bright dipped brass, matte finishes, etc. The electroplates are often the merest flash of the base metals, copper, nickel, chromium, etc.

The "protective" coatings are mainly hot-dipped zinc and tin, paints and light electroplates of zinc or cadmium. The finishes which can be used in the 5c and 10c group are chemical colors, chemical rust proofs, electroplates of the base metals, hot-dip coats, lithographing, paints, porcelain enamels, and straight polishing.

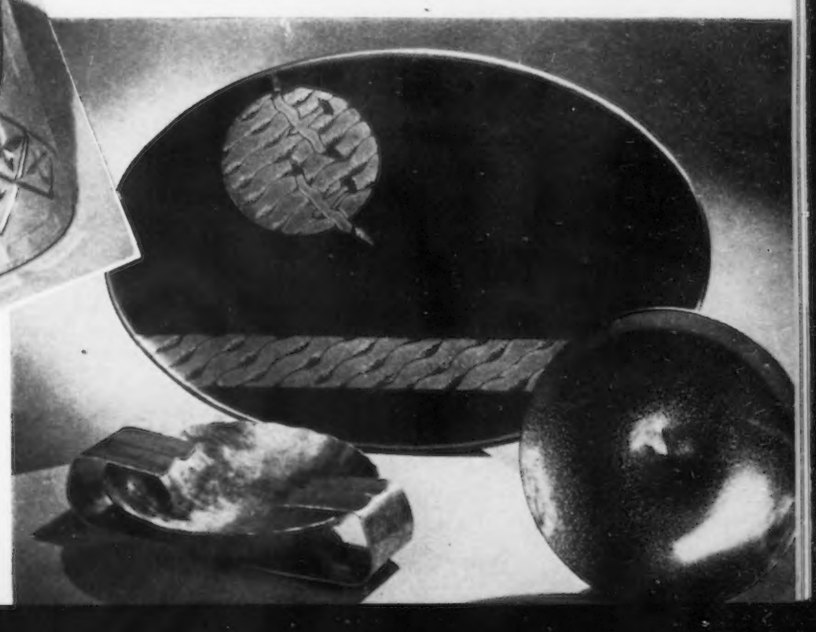
It must be borne in mind that the inclusion of these finishes in the 5c and 10c class does not stamp all of them as intrinsically cheap or "bad" finishes. Some of them by greater care in application, increased thickness of deposit, etc., are eminently suitable for higher priced articles, and are usable as "5 and 10" finishes simply because their methods of application allow considerable latitude.

In this class many of the same finishes used in the 5c and 10c class will appear, but they will have definitely distinguishing characteristics. The protective coatings will be heavier and will serve for decoration as well. The decorative coat will be real—not imitation. Gold, silver and rhodium plate may be used. Plating in colors and in varied color effects is noticeably coming in. Chemical colors, oxides and sulphides will be uniform in color, showing no streaks, blotches, finger-

[2] Finishes are also applied for functional purposes, such as copper on parts of tools and dies to prevent carbonization in heat treatment; cathode sputtering on fabrics, waxes, aluminum alloy diaphragms for carbon broadcasting transmitters; heavy chromium deposits on tools, dies and rolls to reduce wear, etc. Such work, however, will not be included in this discussion.

LEFT

PLATE on non-metallic articles of the more expensive grade. Left—bronze plate on glass candlestick; right — chromium plate on glass decanter. (Courtesy Philip Sievering, Inc.)



BELOW

THE latest word in metal decoration —color plating on gift ware. The ash tray in the right hand corner is finished in "pattern plate," a dappled color plate with iridescent effects, applicable in all colors. (Courtesy United Chromium, Inc.)

prints, etc. Dyed oxide coatings on aluminum will be non-fading and the finish made stain-resistant. Bare polished surfaces will be free from polishing marks. Decalcomania will be properly centered. Colors on lithographed or printed coatings will be correctly superimposed or registered. Bezels on watch cases will be mirror-lapped. Organic coatings will be of special types to withstand the materials to which they are exposed. They will be uniform in thickness, they will have no runs or "orange peel" effects, and they will be firmly adherent. A highly flexible lacquer will be used for articles which may be bent during service, or an oil resistant lacquer for the cover of cosmetic jars, cold cream containers, etc.

All of these properties will be provided within the limits allowed by the price. The finishes applicable in this class are chemical colors, chemical rustproofs (as undercoats), electroplates (including precious metals), clad metals, hot-dip coats or organic coatings, lithographing, paints in multiple coats for outdoor service, sprayed metal and straight polishing of precious or non-tarnishing metals.

Dollar Plus Finishes

Here is a class which necessarily covers a wide range. The prices therein might conceivably range from $2 for a novelty item to $25 for an electrical appliance. It might also include precious metal jewelry, selling much higher on the intrinsic value of its raw material as well as its appearance, finished only by polishing as the metal is noble and consequently self-protective as well as decorative.

The improvements in the finishes previously described for the $1 sellers apply here, but in greater measure. The products will be expected to have long life; consequently the finishes will have to be even more carefully and heavily applied to retain their appearance for a longer time. "Specification" plates appear in this class. Gold, silver, rhodium, color plating in varied effects, art enamels and the finest organic finishes in multiple coats and varied tones and colors are the most conspicuous. There will be found few examples of chemical colors, hot-dip coats, paints, lithographing or bare polished surfaces except where the parts are of precious metals. The finishes applicable here are chemical rustproofs (as undercoats), electroplates, clad metals, organic coats, porcelain enamels and sprayed metals.

Protective Finishes

Although all coatings (even those primarily decorative) act as protectors,

FINISHES FOR

Finishes	Characteristics of Finishes in Various Classes				
Chemical Colors	Protection	Decoration	5¢ and 10¢	$1	Over $1
Oxides, Sulphides, etc.	Low; must be protected by clear organic coat.	Good.	Light coats, short dips.	Uniform, clear colors, free from imperfections, non-fading, etc.	Same as $1 class.
Chemical Rustproofs					
Oxides, phosphates, etc.	Not great; must be protected by oil film. Main use—undercoat for organic coatings and paints on steel	Fair as blues and blacks on steel.	Blues and blacks on steel.	Undercoats for good organic coatings on steel.	Same as $1 class.
Electroplates					
Copper, zinc, tin, nickel, cadmium, chromium, combinations, precious metals, color plates, electrolytic oxides (clear and dyed), etc.	Good in heavy deposits of the proper metal.	Good.	Light "flash" deposits of base metals; "imitation" plates.	Substantial deposits including precious metals; fine color plating effects.	Same as $1 class.
"Immersion Plating"					
Precipitation coats (without current) of copper, tin, silver.	Low; coatings are very light.	Fair to good.	Tin on brass pins, screws, electrical terminals, etc. Silver on mirrors.	Silver on mirrors; heavy coats, well backed with copper plate, lacquer, enamel, etc.	Same as $1 class.
Clad Metals					
Precious metals	Good.	Good, but too expensive for decoration only.	Not used.	Gold filled; Sheffield plate.	Same as $1 class.

METAL PRODUCTS

Finishes	Characteristics of Finishes in Various Classes				
Hot Dip Coats	Protection	Decoration	5¢ and 10¢	$1	Over $1
Zinc, tin	Good in heavy deposits.	Not used.	Light coats.	Heavy coats, "Seal of Quality" weights, etc.	Same as $1 class.
Organic Coats					
Lacquers, synthetics, enamels, varnishes, japans, etc.	Good if properly chosen for specific service.	Good.	Plain colors, one coat, air dry; varnishes, japans, etc.	Baked synthetics, two coats, etc.	Special formulations, various tone combinations, multi-coats, etc.
Lithographing Printing, Decalcomania, etc.	None.	Good.	Simplest, cheapest type of work.	Good registry, careful printing.	Not often used.
Paints	Good.	Fair.	One coat, simple work.	Not often used, except for articles subject to outdoor use, rough handling, etc.; multiple coats.	Same as $1 class.
Porcelain Enamels	Good.	Good—varied colors, etc.	Small kitchen utensils	Kitchen utensils, heavier coats, in colors.	Art objects, statuary, large pieces.
Sprayed Metals					
Most commercial base metals	Good.	Good for special purposes, art objects, etc.	Not used.	Some special novelties.	Art objects, large pieces.
Polishing Only	Little or none, except on stainless steel.	Good on attractive metals.	One or two operations, low cost work.	High polish, free from emery marks, etc., on non-tarnishing metals.	Rarely used except on precious or non-tarnishing metals.

to a greater or lesser extent, many products are coated, mainly for protection against wear and corrosion—that is, against physical and chemical attack.

Wear in service involves abrasion, and "hard knocks." To withstand wear, the finish must be hard and tough or resilient. Resistance to corrosion calls for resistance to the chemical attack of mediums ranging from mild atmosphere to the most corrosive chemical. The purpose of the finish is to provide a resistant surface to protect a cheaper non-resistant basis material.

In consumer products, the finish must receive the seemingly slight but often recurring, and in some instances almost constant, abrasion of human hands, cleaning and washing; as for instance, on door knobs, building and automobile hardware and kitchen implements. The corrosion to which the finish is subjected is mainly air, soap and water, although often food products are involved. In industrial products, the service may be many times more severe: acids, alkalies, salts and almost all of the infinite variety of industrial chemicals manufactured and incidental to plant operations.[3]

In this field, therefore, specifications are most common, in fact indispensable to satisfactory performance. Porosity may be checked by specifying the maximum number of visible pores allowable under a specified porosity test. Thickness or weight of deposits can be specified and checked by a variety of tests. Once the proper standards have been determined, the problem is simpler than in purely decorative coatings where the personal element plays such a large part. Compare, for instance, a specification for a minimum thickness of 0.001-in. nickel plus copper on an automobile bumper with a demand for a "gold finish of a soft greenish 14K color with just a little bit of antique smut—but not too green!" Which directions would the producer rather follow?

The most important protective finishes are chemical rustproofs (as undercoats), electroplates, clad metals, hot-dip coats, organic coats, paints, porcelain enamels and sprayed metals.

"High" vs. "Low" Quality

The inexperienced reader may be confused to find that most finishes are used in both high and low priced arti-

[3] Excellent books covering this broad subject are "The Corrosion Resistance of Metals and Alloys," by McKay and Worthington; and "Protective Coatings for Metals," by Burns and Schuh.

cles; that so many finishes have nothing inherent to stamp their quality.

This is true. Some finishes may appear on 5c articles and on $25 articles, such as chromium plate, for example. The answer is that the plate on the $25 product is vastly superior to the plate on the 5c item. The plate for the cheap article may be only a flash directly on the basis metal. The quality plate is likely to consist of a nickel coat, 0.001-in. thick, or copper and nickel to the same total, covered by chromium, 0.00002-in. thick. The finish will be firmly adherent to the base and free from porosity. Consequently the finish will have not only a good appearance at the time of the purchase, but will also be protective and long lived.

Adherence to the basis metal can be obtained by correct practice; proper preparation, cleaning, and application under correct conditions. Freedom from porosity depends partly upon good finishing practice and partly upon the thickness of the coating, although some remarkable work has been done by Hothersall and Hammond, in producing pore-free deposits in very light weights.[4] The life of the finish, given adhesion and minimum porosity, depends very often upon the thickness of the coating, and for this factor there are guides in the form of specifications.

Specifications of the War and Navy Departments will indicate what these offices require in the way of quality when they purchase a great variety of finished articles. Examination of Federal specifications (obtainable from the Superintendent of Documents, U. S. Government Printing Office, Washington; see price list 75) will be worth while, especially the RR group which include metal products and the WW group which include plumbing fixtures and pipe fittings. The Federal specifications for finishes on plumbing fixtures can be used as a basis for specifications on all related articles such as chromium plated bathroom fixtures, switch plates, curtain rods, etc.

The American Society for Testing Materials has designated standards for many coatings, such as nickel, chromium, cadmium, zinc, etc., and methods of testing for quality (A.S.T.M. designations: A-164-39T, A-165-39T, A-166-39T, etc.).

Thus a manufacturer who wishes to put a good nickel and chromium plate on a steel part will find that a combined thickness on significant surfaces of copper and nickel deposits of at least 0.00075-in. is desirable for outdoor service and 0.0004-in. for indoor or mild service. The minimum thickness of chromium in both cases would be the same, since the corrosion resistance is not increased to any extent by chromium deposits thicker than about 0.00002-in. and may even be decreased if the deposit is too heavy. Its value lies in the maintenance of a non-tarnishing surface. These coatings should also stand up for at least 48 hr. and 16[5] hr. respectively in the continuous salt spray apparatus. The manufacturer will, therefore, specify these minimums and perhaps even increase the requirements by one-third or more to be on the safe side.

A porosity test is usually indicated for all coatings except electronegative metal coatings which have a sacrificial protective action. The salt spray is a common accelerated corrosion test which gives some indication of porosity. Various other tests will be found in the literature and in Government specifications.

Organic finishes should be nonporous and should stand certain tests depending on the use to which the coatings are to be put. Among such tests are abrasion, adhesion, bend, impact, discoloration by heat and light, chalking and flaking on exposure to the atmosphere, resistance to various chemicals such as acids, alkalies, fats, chlorides, alcohol, fruit juices, etc.

The complexity of the problem due to the range of choice of finishes and the special requirements of the articles, may be shown by some examples. Thus what would be considered as a very good tin coating on a diaper pin, would be entirely out of the question on a refrigerator tray. The pin falls into the cheapest group and is not expected to have a long life. An immersion tin deposit is generally used. A quality tin coating on a refrigerator tray, on the other hand, must be heavy enough to stand exposure to the refrigerator atmosphere, to stand occasional cleaning, and to do this for the life of the refrigerator. A hot tin coating or a heavy electrodeposit is required here.

Another comparison could be made between cheap novelty work, where the use of a thin gold plate of about

[4] "The Causes of Porosity in Electrodeposited Coatings, Especially of Nickel on Steel," by A. W. Hothersall and R. A. F. Hammond; a paper presented at the 73rd general meeting of the American Electrochemical Society, April, 1938.

[5] These figures should not be taken too literally, as it is well known that the salt spray test gives varying results.

RIGHT

LIGHTING fixture in chemical colors (oxidized bronze) on zinc-base alloy. A high grade article for indoor use, with the fragile finish well protected by a clear lacquer. (Courtesy Lightolier Co.)

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BELOW

PLATING on plastic. This type of finish is applicable over a wide price range, but is more likely to be found on the better grade articles. (Courtesy Philip Sievering, Inc.)

0.000001 in. in thickness is considered "quality finishing" (since the very cheapest work is given only a gold-colored lacquer), and a gold-filled watch case which requires at least 3000 times this thickness on the outside. (Federal Trade Commission Ruling, Jan. 25, 1923.) Both are "quality" finishes for their price classes, the types of service and the life of the article.

Often it is assumed that all that is required to change an inferior coating to a quality coating, especially in the case of electrodeposits, is to increase the thickness of the coating, but this may be a false assumption. On some

ABOVE

CHROMIUM over nickel and copper on a paper towel rack for use in a moist atmosphere, the wash room. (Courtesy Apollo Metal Works.)

o o o

LEFT

CHROMIUM plate is applied to consumer merchandise ranging in price from a few cents to many dollars. (Courtesy Philip Sievering, Inc.)

classes of work such as silverware or gold-filled articles, increasing the thickness of the coating may be in large part, though not entirely, the answer to quality requirements. On the other hand, doubling the thickness of the copper and nickel plate on a zinc base die cast automobile door handle, will not result in a quality finish if the copper and nickel plates are porous or non-adherent. Two coats of a nitrocellulose lacquer on a tray instead of one, do not make the coating a good one, when an alcohol resistant synthetic should have been used in the first place.

The metal findings on a pair of men's braces are usually of brass, finished with a gold colored lacquer in the case of very cheap work, and a light gold plate or a color-plate in various effects, covered by a protective lacquer, in the case of the better grade of merchandise. Increasing the thickness of the plate on the higher priced item will not be enough of an improvement to be worth while. The gold or color plate is so thin that the finish is entirely dependent upon the wear-resistance of the lacquer. In such a case, further improvement in the quality of the article should be sought for in the improvement of the lacquer coating.

It must not be overlooked that appearance is important today even in strictly utilitarian products. For example, take the lowly garbage can which is generally hot galvanized. Even in this extreme case quality can be brought to the attention of the buyer by the use of a white air-drying or baked enamel coating. Cans so finished are in universal use in hospitals and have made deep inroads into the modern kitchens. The superiority of the enameled can over the galvanized is obvious at a glance.

Another case is the lawn mower, generally painted, but now also made with heavy cadmium or zinc plate on parts of the mechanism which might have to be removed occasionally and where rusting would interfere; also a baked synthetic on the frame and handle and a heavy nickel and chromium plate on the ornamental attachments or parts which must resist wear.

In all classes of consumers' goods quality finishing has been found to be a prime aid in selling. For that reason, electroplates, the high luster finishes, attractive enamels and color plating are assuming more and more general importance as they are applicable over a wide range of cost. Applied to quality standards, they look like quality. They complete the perfect combination—a quality product with a quality finish.

Short Cycle Annealing

By R. M. CHERRY
Industrial Department, General Electric Co., Schenectady

—Application of electric furnaces to reduce the time cycle for the annealing of malleable iron. Specific construction and operating data on the continuous roller hearth and pusher tray furnaces.

THE term "short cycle" has been applied to every annealing cycle or type of furnace that reduces the total annealing time normally required in an old style fuel-fired periodic furnace.

This saving in time may be the result of a change in the analysis of the iron, new furnace equipment, change in method of loading, change in operating temperature or a combination of two or more of these changes.

In the old style fuel-fired periodic furnace, where the castings are packed in heavy cast pots, the time for bringing to temperature and the time for cooling are very long, due to the mass of the gross charge and the furnace. The heating and cooling represent a very large percentage of the total time in the furnace.

In addition, the time at temperature is usually long in the old style periodic furnace, this long time being made necessary by the lack of uniformity of temperature distribution throughout the furnace.

It is apparent, then, that the time cycle for the annealing of malleable iron can be decreased by:

(1) Change in the analysis of the iron (usually by increase in silicon content).

(2) Use of a protective gas atmosphere in the heating chamber, thereby eliminating the necessity of closed containers and packing materials, resulting in less time to heat and cool.

(3) Loading the castings in smaller baskets, thereby decreasing the time for heating and cooling.

(4) Installing modern furnace equipment that will give uniform temperature distribution day in and day out, have a minimum of heat absorption by the furnace walls, and which will provide a definite control over the time temperature annealing cycle.

As an example, one malleable foundry has reduced the total time of annealing from the old cycle of 8 to 9 days (over 200 hr.) in a powdered coal-fired periodic furnace to approximately 36 hr. in an electric batch furnace of the elevator type. This decrease in annealing time was brought about by a change in type of furnace, method of loading and temperature of the high temperature portion of the cycle. In this electric furnace installation, the castings were loaded without any packing material directly on the car loading platform, some of the castings being loaded in containers and some being of such shape that they could be loaded without any containers. Due to the change in method of loading, a higher temperature was permitted; therefore, the time required for holding at the high temperature was considerably decreased by this slight increase of the operating temperature.

Another example of reduction in annealing time is in a foundry where formerly the castings were annealed in a fuel-fired periodic furnace, the castings packed in heavy pots and total annealing time about 7 days (168 hr.). This particular foundry installed a modern electric, continuous type furnace of the roller hearth type and the total overall cycle today is approximately 15 hr.

This reduction in time was due to many factors, including elimination of the closed containers and packing material, loading the castings in small batches on trays where they heat and cool quickly, use of protective gas atmosphere in the furnace which eliminates any packing material, a change in the analysis of the iron and the use of the continuous type furnace.

From the foregoing, it is evident that the term "short cycle" is not definite but simply a term for indicating that a change or changes have been made in the annealing practice.

The interest in short cycle annealing is not primarily for the shorter time but, naturally, to obtain the operating economies that such short cycles give. There are certain obvious sav-

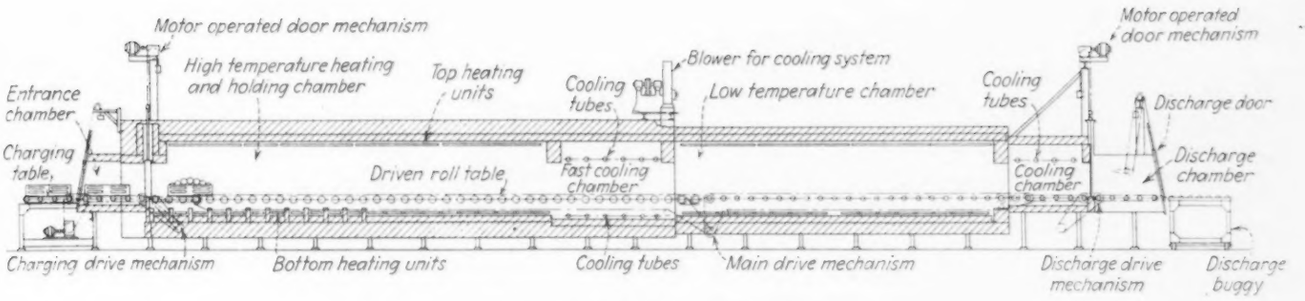


FIG. 1—Outline of a typical electric roller-hearth furnace.

ings and advantages in decreasing the annealing time and a careful analysis will show many additional savings.

FURNACE:

In the electric furnace, the heat can be located where desired and in the amount desired, thereby providing accurate temperature control and uniform temperature distribution. This distribution of the heat in the electric furnace remains constant, therefore making it possible to duplicate the results day in and day out with a minimum of attendance.

There are several types of furnaces that may be used and the selection of the proper type and size of furnace will depend on the maximum production, annealing cycle desired and how much the production will vary from time to time.

Where the production warrants a continuous furnace, a roller hearth and a pusher tray furnace are to be considered. For smaller productions, or for any auxiliary equipment, to provide additional flexibility in the larger foundries, a batch type furnace such as the elevator furnace is used.

CONTINUOUS FURNACES:

For large production that warrants the continuous type furnace, the question is to select the proper size of roller hearth or pusher tray furnace.

For both types of furnaces, the castings to be annealed are loaded in small batches in alloy trays and these loaded trays are conveyed continuously through the furnace.

In the roller hearth furnace, the loaded trays are moved continuously through the furnace by means of a driven roll table. The furnace rolls extend through the furnace walls to self-aligning bearings and are driven by sprockets and chains.

In a pusher tray furnace, the loaded trays are intermittently moved one tray length at a time by means of a pusher mechanism. The loaded trays are usually supported in the furnace by means of roller rails made of cast alloy and having metal-to-metal bearings or the rollers may be mounted on the bottom of the trays.

Both of the continuous type furnaces have their uses, but in the majority of cases the roller hearth furnace has certain advantages that warrant its selection over the pusher tray furnace.

For the same production and annealing cycle, the first cost of the roller hearth furnace is usually more than that of the pusher tray furnace but this difference is partially offset by the lower first cost of the trays required for the roller hearth furnace. The trays in the roller hearth furnace can be made much lighter since they

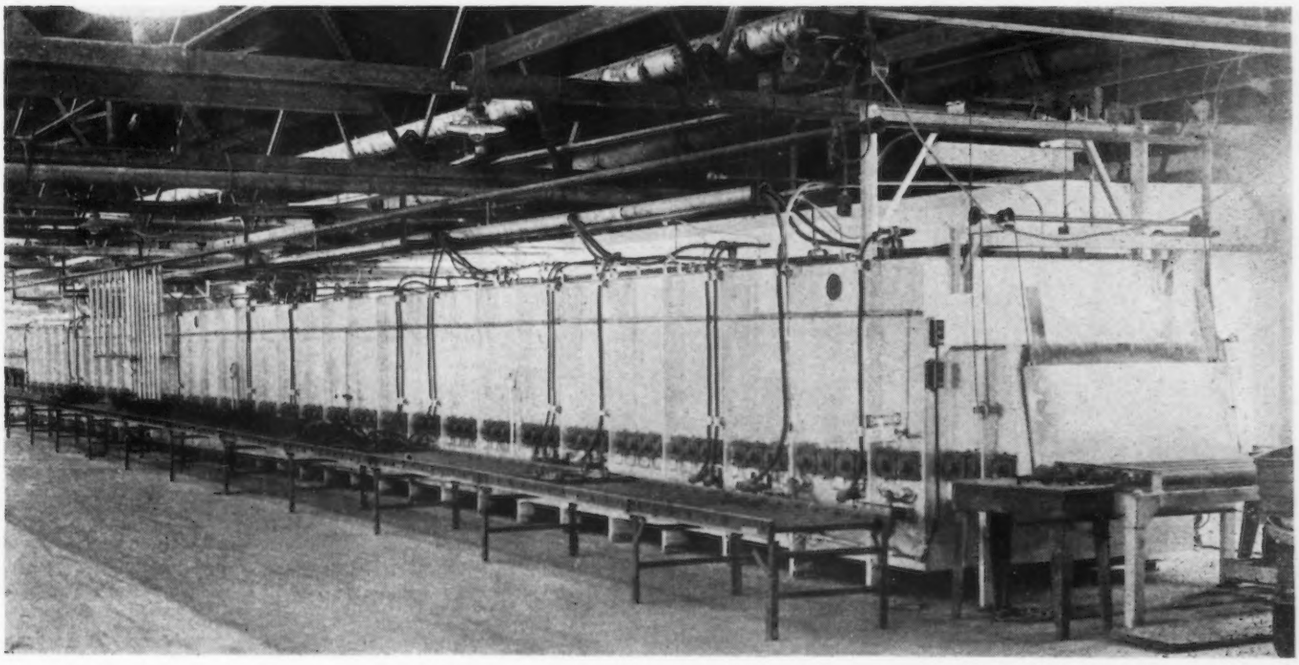


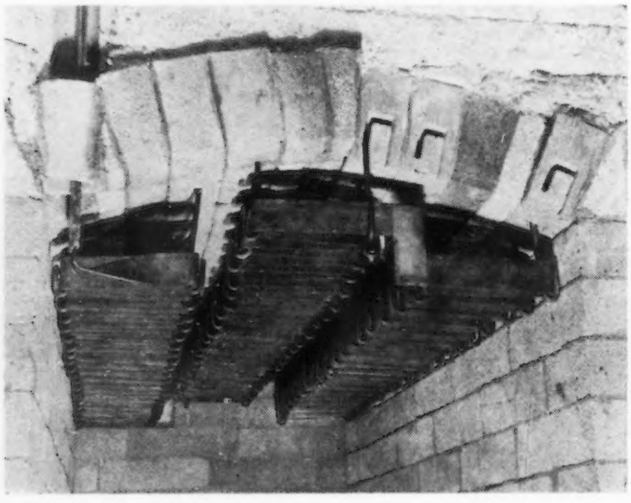
FIG. 2—Installation of an electric roller-hearth furnace for annealing of malleable iron castings. Oblique view showing charging end and tray-return conveyor.

are required to support only the loads on the trays while the tray in the pusher tray furnace must be of sufficiently heavy design to take the push of the entire load in addition to carrying its own load of castings. In general, the efficiency or economy of operation (that is, kw-hr. per net ton of castings annealed) is, if anything, slightly in favor of the roller hearth furnace.

Other advantages of the roller hearth furnace as compared to the pusher tray furnace are: Lower maintenance cost, particularly on the trays and roller rails and the ease with which the furnace can be cleared of work when a shutdown is desired. In the case of a pusher tray furnace empty trays, or, in case of a long furnace, trays filled with scrap load, must be loaded into the furnace in order to push out the good castings before shutting down.

A typical roller hearth furnace shown in the outline in Fig. 1, and a typical installation of such a furnace is shown in Fig. 2.

The scheme of operation of this roller hearth furnace is as follows: Two loaded trays are placed in the loading position on the roll table in front of the furnace, there being two rows of trays in the width of the furnace. When the trays are in position, the operator raises the door to the entrance chamber of the furnace and pushes the two trays into the entrance chamber and closes the front door. When the trays in the main heating chamber have advanced one tray length, thereby providing room for a charging of the new tray, then automatically, as controlled by limit switch, the door between the entrance chamber and the main heating chamber is opened and the two trays in the entrance chamber are automatically rolled into the heating chamber and the door closes. As the trays near the discharge door of the main cooling chamber, they contact a limit switch and automatically the door at the end of the main cooling chamber is opened and a separate drive mechanism near the discharge end picks up to overdrive the last few rolls in the cooling chamber and rolls the last tray in each row out into the discharge chamber quickly and there the trays are stopped and the door at the end of the main cooling chamber is closed. The operator then opens the door of the discharge chamber and pulls out the trays on the discharge table. With this scheme of operation, the furnace chamber proper is never opened to the outside atmosphere.



ABOVE

FIG. 4—A typical method of mounting resistors in bottom of furnace.

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LEFT

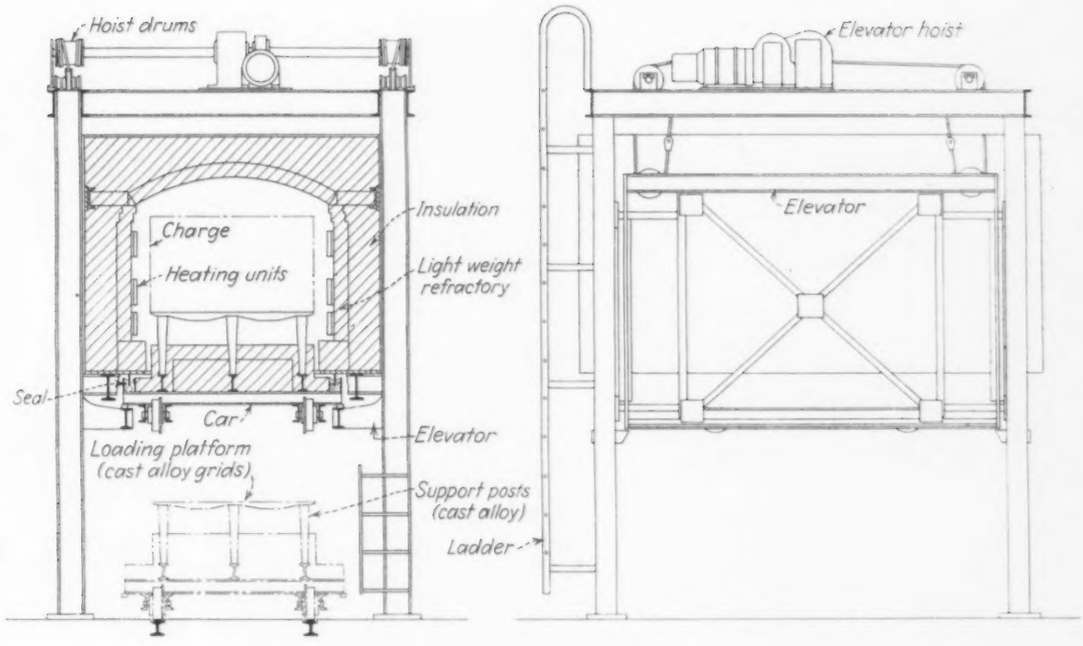
FIG. 3—A typical method of mounting resistors in roof of furnace.

When the tray has been emptied, the discharge table is pushed over in front of the return gravity roll table and the empty tray is pushed off onto this return roll table and thereby returned to the loading end of the furnace. Usually the castings are loaded while the trays are on the return gravity roll table and then the loaded tray is picked up by means of a monorail hoist and placed in loading position at the front of the furnace.

The length of the furnace is divided into four main sections. First, the high temperature section where the castings are heated to the required temperature, say 1750 deg. F., and held at that temperature for the required

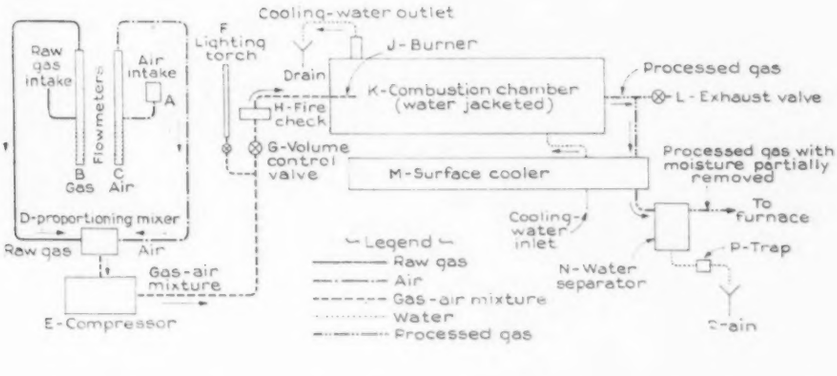
RIGHT

FIG. 6—Outline of a typical single chamber electric elevator furnace.



BELOW

FIG. 5—Schematic drawing of a General Electric atmosphere-gas converter.



number of hours; the second section is the fast cool section where the castings are quickly cooled from the high temperature to the required low temperature portion of the cycle. This cooling is accomplished by means of cooling tubes located above and below the loaded trays. These tubes are made of heat-resisting alloy and extend through the walls of the furnace—one end of each tube is connected to a common header to which is connected a motor-driven blower. This blower forces air through the cooling tubes and the cooling is automatically controlled by means of a thermocouple operating in conjunction with the standard type of temperature control instrument and control panel which throws the motor blower on and off to control the cooling. The third section is the holding or slow cool section of the low temperature portion of the cycle and this is usually followed by another fast cool section for cooling the castings to some lower temperature before they are discharged from the furnace. In this last fast cool section, the cooling is normally accomplished by means of water cooling tubes located in the top of the furnace.

In these continuous type furnaces, the high temperature section is heated by ribbon resistors mounted in the top of the furnace and in the bottom of the furnace, underneath the trays. The heating units are divided into several separately controlled circuits in the length of the high temperature chamber. Likewise, the low temperature portion of the cycle where the castings are held at constant temperature or where they may be cooled at a definite rate, there are heating units mounted in the roof and in the bottom of the furnace and these divided into two or more separately controlled circuits in the length of that chamber.

The illustrations in Figs. 3 and 4 show typical methods of mounting the heating units in the roof and in the bottom of such an electric furnace. As shown in the illustration of the roof heating units, the end of each loop of the heating unit is supported by heat-resisting alloy hook which in turn is supported by a refractory compound insulator which is built into the arch of the furnace. This construction is such that the supporting alloy hooks can be very readily removed. As shown in the illustration for bottom heating units, the bottom heating units are supported and spaced by refractory compound insulators which, in turn, are built into the bottom brickwork of the furnace.

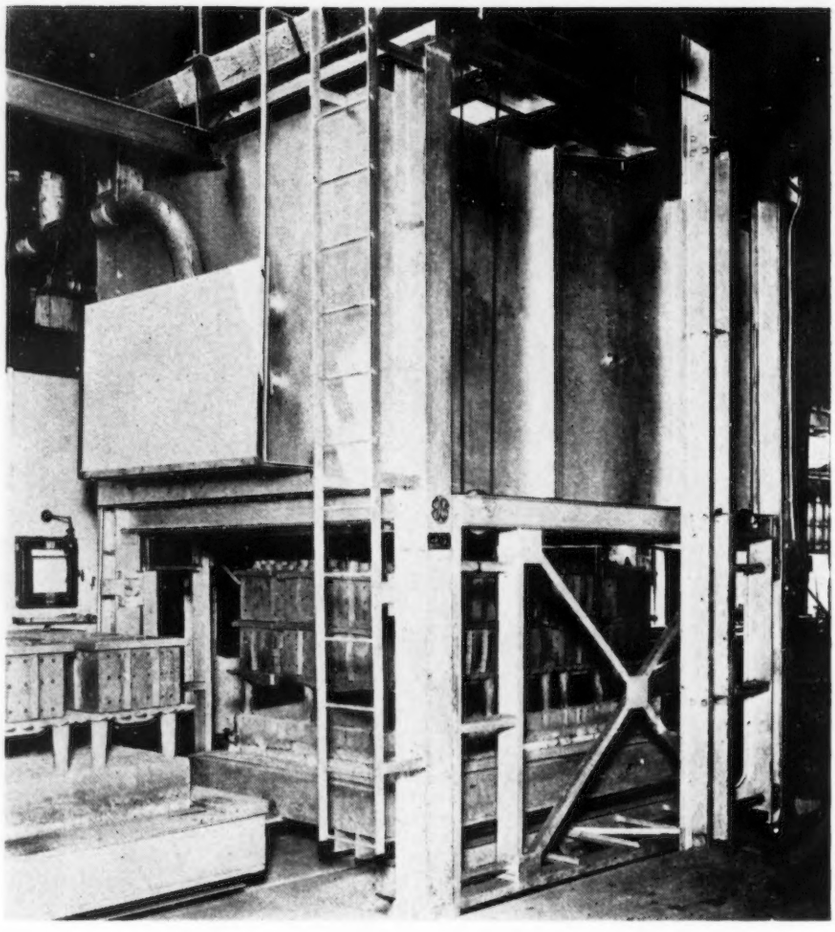
One typical installation of such a roller hearth furnace has inside wall to wall width of furnace of 62 in. and overall length of furnace of approximately 130 ft. The castings are loaded in trays having overall dimensions of approximately 27 in. by 27 in. and loading approximately 10 in. high and loading two trays in the width of the furnace. Each tray weighs approximately 150 lb. and holds approximately 475 lb. net of castings. The total production is approximately 35 net tons of castings per 24-hr. day where the total annealing cycle is between 14 and 15 hr. and the total energy consumption is approximately 267 kw-hr. per net ton of castings annealed.

The protective atmosphere for the furnace is provided by an atmosphere gas converter of the combustion type used for processing the available city gas, natural gas, or any of the tank gases, such as butane or propane. A schematic diagram of a typical atmosphere gas converter is shown in Fig. 5.

The atmosphere converter consists of two visual flow-meters, one for the air and one for the gas to give direct reading of the air and gas, a motor-driven air-gas mixer and compressor, a fire-check, a burner, water cooled

combustion chamber and a surface cooler with water trap.

The suction of the rotary compressor draws the air through air intake filters through the visual flow gage into the automatic ratio control valve. Depending on air flow, the ratio control valve allows more or less gas to be drawn through the gas flow gage. The air and gas are thoroughly mixed and compressed in the rotary compressor. A pressure relief valve on compressor maintains a definite output pressure of the air and gas mixture which flows through a fire-check to the burner. On leaving the burner, the air and gas mixture ignites due to the temperature of the combustion chamber. The combustion is facilitated by a catalyst which insures complete utilization of all oxygen. The products of combustion then pass through a water-cooled surface cooler where excess moisture is condensed out of the gas. The outgoing protective atmosphere is then ready for use in the furnace or for further processing as required. By varying the ratio of the air-gas input, the analysis of the output gas can be varied over a rather wide range.



Batch Type Furnaces

For foundries with smaller productions, as well as for larger foundries desiring increased flexibility of annealing equipment, the batch type furnace is to be considered.

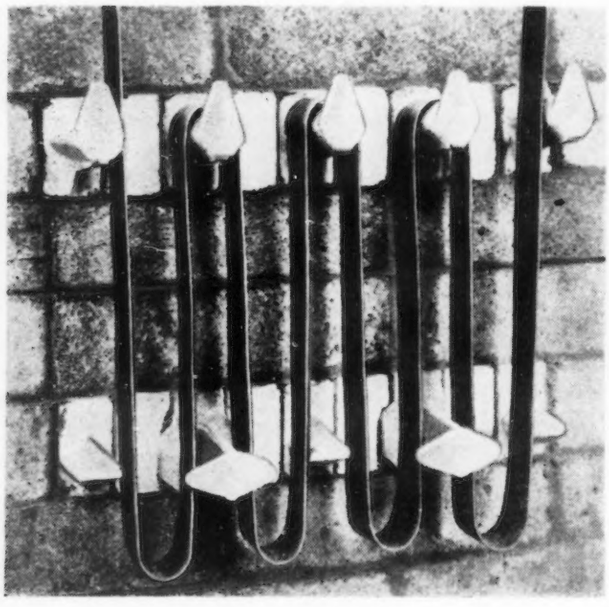
Such a batch type furnace is the electric elevator furnace with one or more chambers built into one shell, the number of chambers depending upon production and annealing cycle.

In this type of furnace, the charge is loaded on a car, usually the castings being loaded in light-weight containers and the loaded car is elevated into the heating chamber.

Where a single chamber elevator furnace is used, the charge after completion of the high temperature portion of the cycle is removed from the furnace and permitted to cool outside of the furnace to the lower temperature required for the graphitizing and then put back into the furnace. The cooling can also be accomplished by providing the furnace with an auxiliary cooling system for rapid cooling of the charge and furnace together.

In the case of a two-chamber furnace, one chamber is used for the high temperature portion of the cycle and the other chamber is used for the low temperature portion of the cycle. In such a furnace, after the completion of the heating and holding time at the high temperature, in one chamber, the charge is removed from that chamber and immediately placed in the low temperature chamber where the charge is then quickly cooled down by means of an auxiliary cooling system to the required low temperature and then held or slow cooled for the low temperature portion of the cycle.

The use of the multiple chambers eliminates the heating and cooling of the furnace necessary if only one chamber is used. Further, it gives minimum standby heat losses and



ABOVE

FIG. 7—Installation of a single chamber electric elevator furnace for annealing of malleable iron. Car loading platform 51 in. wide by 102 in. long and 30 in. loading height. Furnace rated 115 kw., 220 volts, 3 phase.

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LEFT

FIG. 8 — A typical method of mounting resistors on furnace walls.

therefore, lower energy consumption, lower overall cost, as compared with a single chamber furnace or two or more single chamber furnaces for the same production.

A typical single chamber elevator annealing furnace is shown in the outline illustration in Fig. 6 and an installation Fig. 7.

In this type of furnace, the heating units are of the ribbon resistor type and mounted on the walls of the furnace in a manner similar to that shown in Fig. 8.

As shown in the illustrations, each car is provided with an elevated platform, this platform consisting of cast heat-resisting alloy grids which in turn are supported by means of hollow heat-resisting cast alloy posts which extend down to the steel framework of the car. By this construction, the charge is elevated into the furnace a sufficient distance above the brickwork of the car to insure uniform and rapid heating of the charge. The construction also is such that the top brickwork of the car can be very light since no castings are loaded directly on the brick, thereby providing a car with a minimum of heat absorption which means lower energy consumption, faster and more uniform heating and cooling of the charge.

The lifting mechanism on the furnace consists of motor-driven drums to which are attached lifting tables and these tables are in turn fastened to the elevating mechanism located at the side of the furnace. Usually this motor-driven mechanism is mounted on top of the furnace out of the way.

There is a total of eight such furnaces installed in one malleable foundry. In this particular instance, the high temperature portion of the cycle is carried out in one furnace and then the charge is transferred to another furnace for the low temperature portion of the cycle. Each car has a loading platform 4 ft. wide by 12 ft. long, 3 ft. high, and the charge varies from 3 to 10 tons, depending on the castings, but the average is approximately 6 tons net charge and the average energy consumption on a 6-ton average charge and for a total of 36 hr. cycle, is approximately 380 kw-hr. per net ton.

A two-chamber elevator furnace is shown in outline in Fig. 9. In this particular installation, the two annealing chambers are built into one common shell; otherwise the two chambers operate as independent furnaces, each being equipped with its own heating units and automatic controls. The low temperature chamber is equipped with heat-resisting alloy cooling tubes mounted in the top of the furnace which are used for cooling the charge down after it has been transferred from the high temperature chamber. The charge is cooled down to the required low temperature, the charge is permitted to equalize and then the charge is cooled at a definite rate for a period of hours.

The cars have a loading platform 51 in. wide by 102 in. long and a loading height of 34 in., with the high temperature chamber rated 210 kw. and the low temperature chamber 150 kw., each for 220 volts, 3 phase. Each charge consists of a total of 16 containers loaded two wide, four long and two high, each container weighing approximately 125 lb. and each container holding approximately 500 lb. net of castings, thereby giving a net load of 8000 lb. per charge, plus 2000 lb. of containers, or a gross charge of 5 tons. In this particular installation, the castings are of high silicon content and the total annealing cycle is 24 hr., allowing 12 hr. in the high temperature portion of the cycle and 12 hr. in the low temperature chamber. The production is two charges per 24-hr. day or a total of 8 net tons per day at an energy consumption of 300 kw-hr. per net ton of castings annealed.

The atmosphere in the batch type furnace is provided by the castings and no separate atmosphere equipment is required. Usually on starting up the furnace, and placing a cold charge in the high temperature furnace, it is desirable to put a small amount of charcoal on top of the cold charge going into the furnace. The elevator type furnace is a very tight furnace as all of the joints of the furnace casing are welded gas-tight and all terminal outlets are provided with gas-tight stuffing boxes. Also, the car is provided with a seal around the periphery of the car.

ADVANTAGES:

The use of the modern type electric furnace for annealing malleable iron castings results in the saving of money and time and improvement of quality. The principal savings being:

(a) Elimination of heavy cast pots and packing material.

(b) Less labor required for loading and unloading castings and less furnace attendance.

(c) Shorter annealing time, thereby making possible shorter shipments and less inventory.

(d) Greatly improved working conditions, particularly the elimination of any dusty packing material.

(e) Saving in floor space of 50 per cent or more.

(f) Uniform quality of annealing and the assurance of duplication of that uniformity day in and day out.

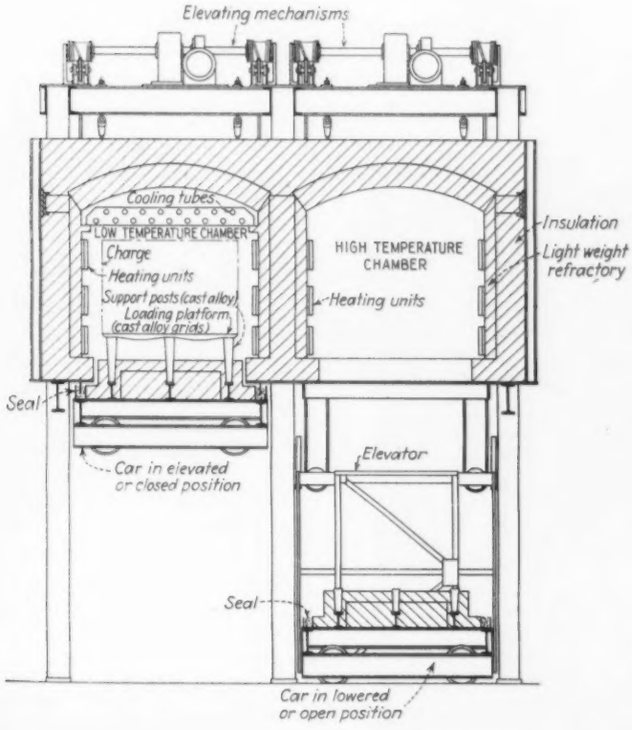
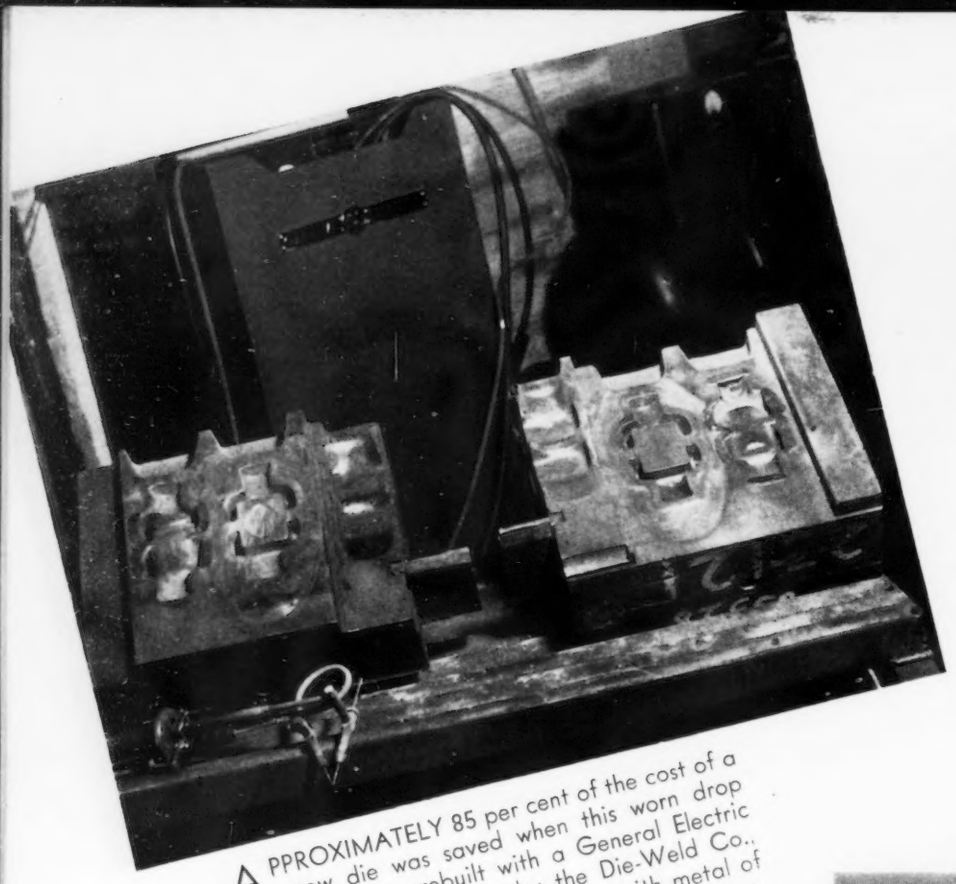


FIG. 9—Outline of a typical two-chamber electric elevator furnace.

What's

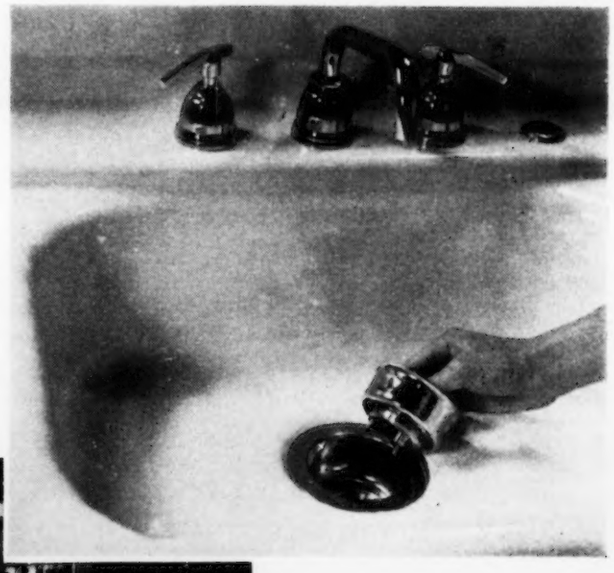


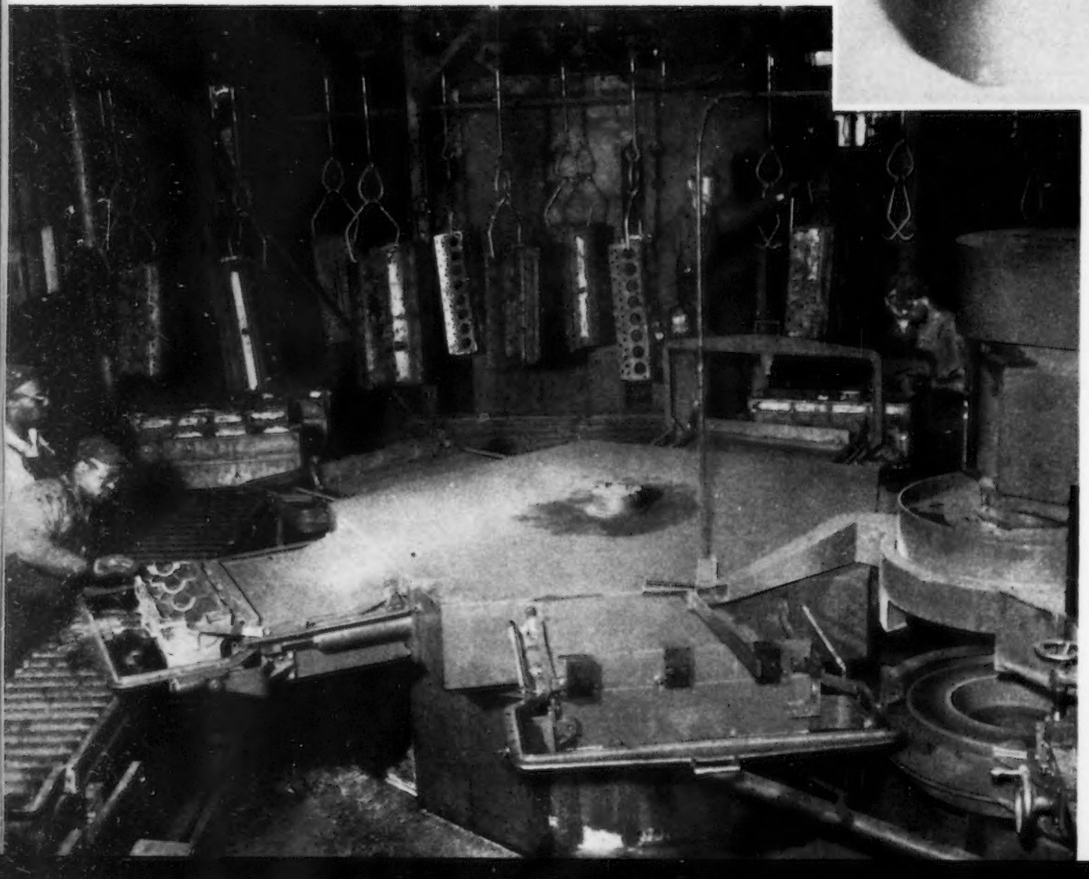
APPROXIMATELY 85 per cent of the cost of a new die was saved when this worn drop forging die was rebuilt with a General Electric atomic hydrogen welder by the Die-Weld Co., Toledo. All worn spots were filled with metal of the same analysis as the die itself (low chromium, high carbon steel). In this particular case, subsequent annealing was not required to permit machining.

BELOW

STAINLESS steel and a low cost finishing process known as "pickle polish" are now employed to make stainless steel plumbing fittings on a commercial scale. Made of Armco stainless steel by the Schaible Foundry & Brass Co., Cincinnati, kitchen fittings of this solid metal are rustless and easy to keep clean.

The "pickle polish" method developed by metallurgists of the American Rolling Mill Co. and the Rustless Iron & Steel Corp. eliminates costly hand polishing. The fittings are available in two finishes: (1) mirror, or (2) silvery satin.





LEFT

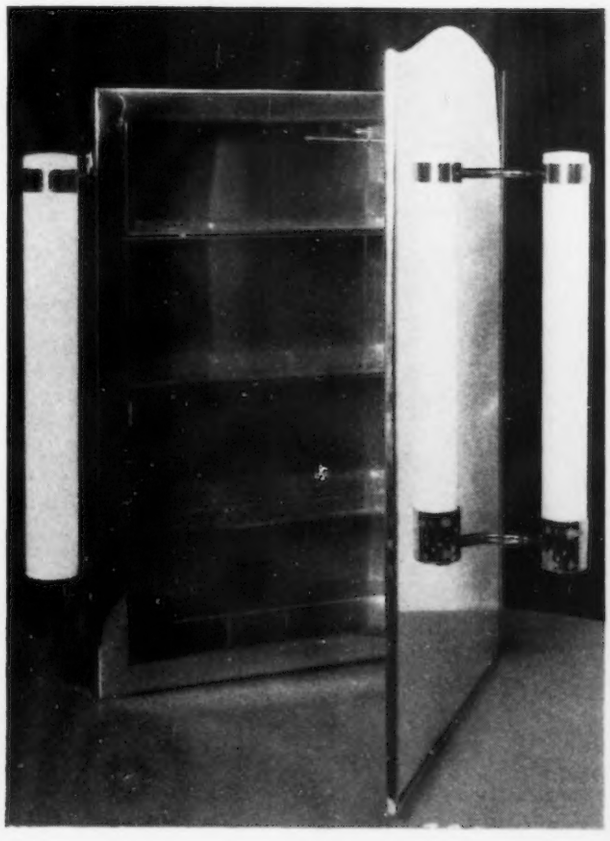
AROUND they go, and the milling of Pontiac motor blocks is raised from 120 to 350 per hr. by installation of an automatic top-and-bottom grinding machine. The blocks pass under and over grinding wheels (at lower right). This new machinery is part of Pontiac's million dollar foundry renovation program recently completed.

New!

BELOW

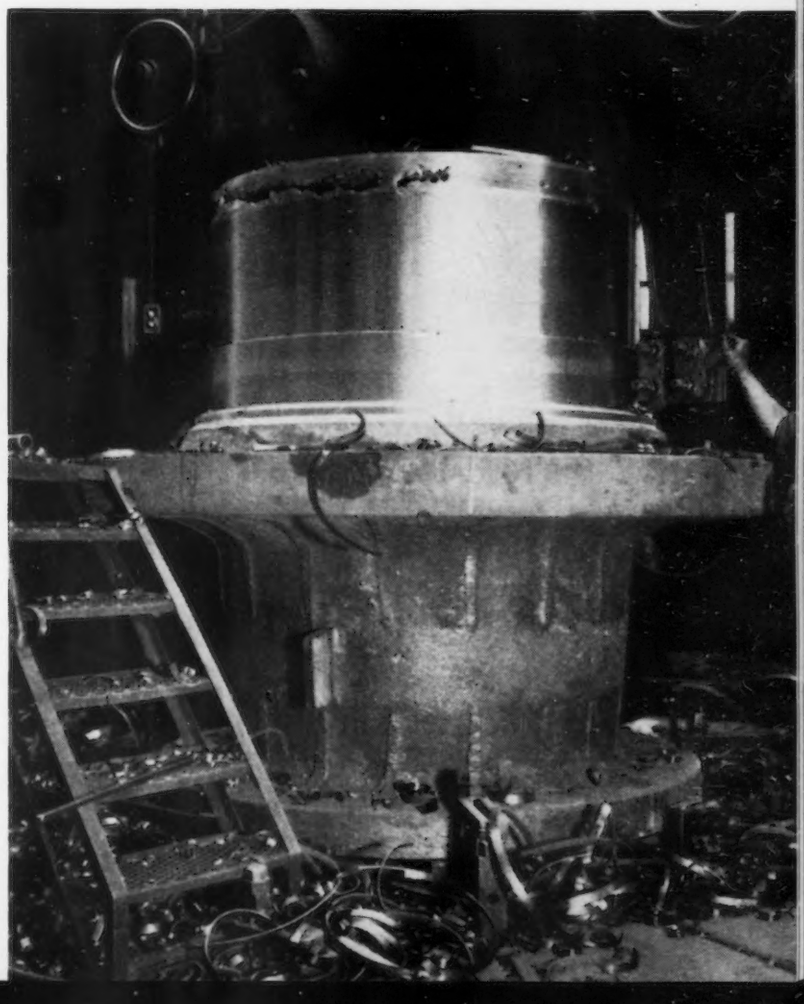
THE National Metal Products Co., Waterloo, Iowa, is offering a stainless steel bathroom cabinet as the latest addition to its line of baked enamel cabinets. The cabinet comes in three sizes ranging from 11¼ x 17¼ in.; 13¼ x 19¼ in.; to 14½ x 20½ in.

BLACK spots appearing in the vitreous enamel over welds on light gage steel refrigerator cabinets have been reduced by 90 per cent through the use of a.c. welding. It is also claimed that warpage has been eliminated and welding time reduced. The photo shows a welder joining the cross rail to a refrigerator cabinet. Food compartment liners may be seen in the background. Photo by Westinghouse.



RIGHT

TURNING of this steel casting rotor spider hub was done at the rate of 612 lb. of chips per hr., using two single point carbide tipped turning tools, according to Carboloy Co., Inc. Use of carbide tooling cut costs to ½¢ per lb. of chips, including tools and labor. Depth of cut was ¾ in., with a feed of 1/16 in. Cut was taken the entire length of riser, 37 in., before regrinding of the carbide tipped tools was necessary.



Pendulum Hardness Testing Machine

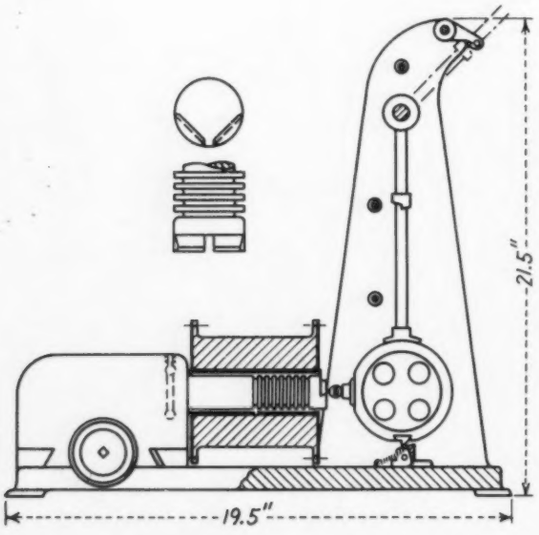
A NEW design of pendulum indentation hardness testing machine described by H. Cornelius and W. Trossen in *Stahl und Eisen,* enables the hardness of metals to be measured at elevated temperatures. Arrangements are provided allowing the specimen under test to remain in the heater while the hardness is being measured. This permits a series of measurements to be made in quick succession and at various temperatures; at the same time, it avoids the disturbing drop in temperature obtained on removing the samples between individual measurements.

The general design of the apparatus may be gathered from Fig. 1, which shows the sample clamp and the heater incorporated in one unit. Indentations are produced by means of a ball of a hard metal alloy, 5 mm. in diameter, which allows measurements on materials retaining a high coefficient of hardness at high temperatures, such as stellite. The pendulum hardness of metals with a Brinell value below 100 units is, however, measured with a ball of 10 mm. diameter. A double swing by the pendulum is avoided by a stop which arrests the pendulum after making the first indentation.

The holder securing the sample under test is made of a heat-resisting alloy, completely scale resisting up to 2012 deg. F.; it rests against a heavy water cooled block. The rear surface of a sample is placed against this block, while the front machined end rests on the holder proper. The furnace is pushed over the holder in a horizontal direction, being mounted on rollers, and the assembly of block with sample holder and furnace can be displaced in the plane perpendicular to Fig. 1 by a hand-operated screwgear, the displacement being indicated on a scale. The temperature of the sample is measured by means of a thermocouple consisting of a solid double-bore cylinder, the bare junction being placed in contact with a machined spot on the sample.

When hardness measurements at elevated temperatures are made, the furnace is drawn back just sufficient for the ball to strike against the sample, but without the pendulum coming in contact with the furnace body. During the time indentation is being made, the sample thus remains in the forepart of the furnace, the latter being returned to its initial position wholly to inclose the sample immediately after the pendulum has made impact. The whole operation of indentation takes only a few seconds. To obtain a second indentation in the same sample, the block assembly with the furnace, etc., is displaced slightly sideways across the pendulum.

The pendulum hardness can be expressed in the usual way by the energy of impact in mm-kg. divided by the volume of the indentation in cu. mm., but this has the disadvantage that the unit of measurement is less well-known than the more common Brinell and Vickers hardness values. Calibration curves were, therefore, plotted which enable the experimental values given by this apparatus to be converted to Brinell and Vickers values. The curve applies to room temperature and was plotted from measurements on copper, brass, alloys in the Al-Cu-Mg series, Al-Mg, mild steel, Fe-Cu alloy with 1.5 per cent Cu, structural steels St 37.11, St C 60.61, and VCMo 125 in the annealed states, Ni-Cr-Wo steel annealed to different hardness values, austenitic Ni-Cr steel and welded-on plates of stellite. The results obtained with cold-rolled samples do not conform with the calibration curve plotted in respect of non-cold-rolled samples. The temperature function of the pendulum hardness for different materials is reproduced in Fig. 2. It may be recalled that, while the samples are being raised to the temperatures of measurement, copper begins to be precipitated and the hardness increases as a result. The shape of the hardness isotherms is similar to that obtained after annealing and measuring the Brinell hardness at room temperature.

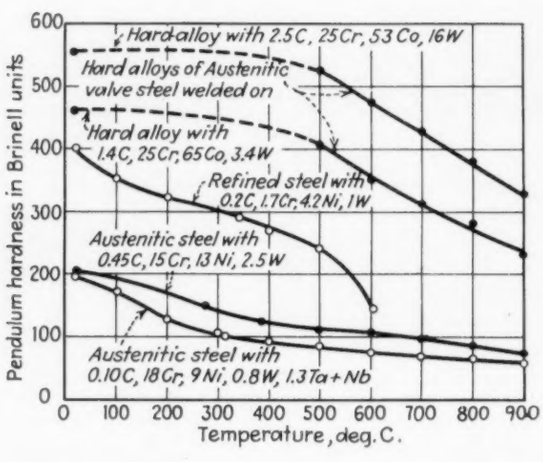


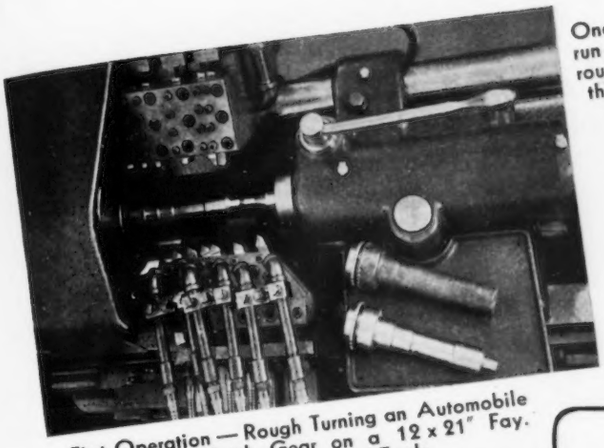
AT LEFT

FIG. 1—Pendulum indentation hardness measuring machine.

AT RIGHT

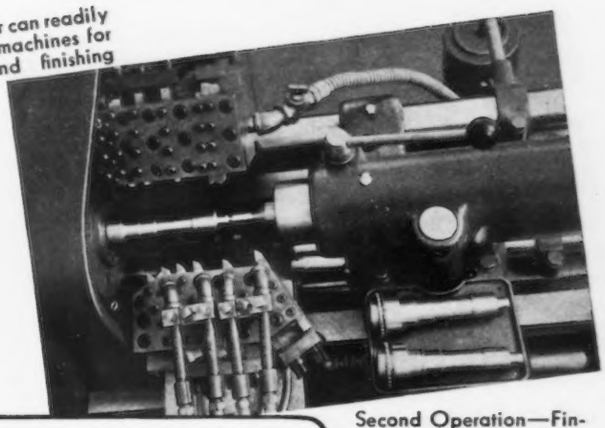
FIG. 2—Pendulum indentation hardness of different materials, plotted against temperature.



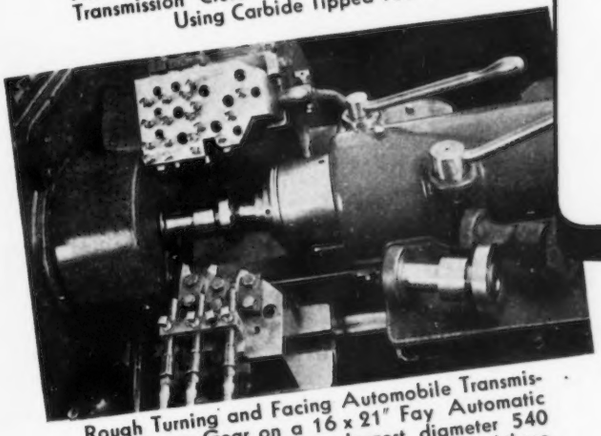


First Operation — Rough Turning an Automobile Transmission Clutch Gear on a 12 x 21" Fay. Using Carbide Tipped Tools.

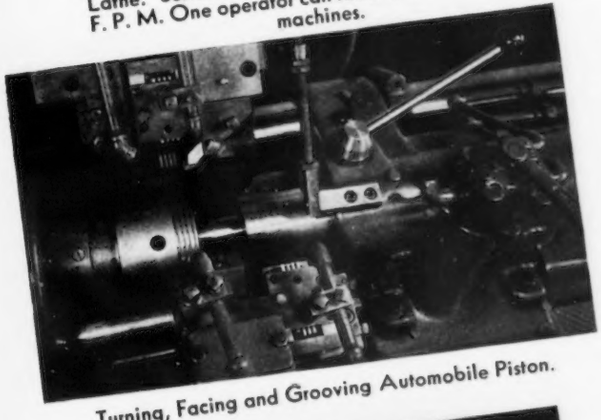
One operator can readily run the two machines for roughing and finishing this piece.



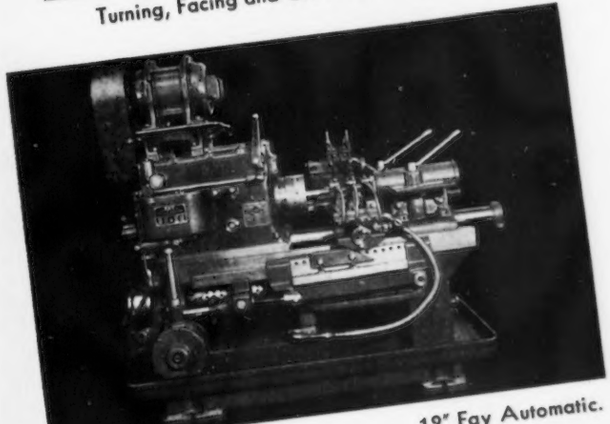
Second Operation—Finish Turning an Automobile Transmission Clutch Gear on an 8" x 21" Fay. Using Carbide Tipped Tools.



Rough Turning and Facing Automobile Transmission Cluster Gear on a 16 x 21" Fay Automatic Lathe. Surface speed on largest diameter 540 F. P. M. One operator can readily run two of these machines.



Turning, Facing and Grooving Automobile Piston.



12" Fay Automatic.

Looking Forward

TODAY, the rapid development of fast-cutting, hard-alloy tools has reached a point where only the most rugged machines can use them to maximum advantage, relegating others to the economic scrap heap for, however good the tools, they can never be efficient except on machines built to use them.

Tomorrow will see still greater improvement in these tools, imposing still heavier loads on the machines that use them. Wise is the manufacturer who gives full weight to this consideration.

Fay Automatic Lathes today are extracting every cent of profit from the superior performance of these tools *and will continue to do so.* For, into them is built a reserve capacity that will enable them to operate at the highest speeds that tools and materials will allow, not only today, but for years to come.

Descriptive literature covering all models is available and we are always ready to demonstrate their value in the Production Line.

●

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On The Assembly Line

BY W. F. SHERMAN
Detroit Editor

• Assistant War Secretary finds industry cooperative, says plants will not be drafted . . . Tells Detroit manufacturers conscription will not deplete factory manpower . . . Nash "600" model draws attention

DETROIT — This automotive city is going to "become a regular three-ring circus" under the armament program, according to Robert P. Patterson, Assistant Secretary of War, who added that he "probably will be here often" in carrying out his duties. Patterson, here to address the National Industrial Advertisers Association, took time out during his brief hours here to telephone Edsel Ford. He declined to say what was discussed other than that it concerned the airplane motor plant which Ford Motor Co. is building.

Patterson's visit was the occasion for an official statement of policies which will govern the War Department in some of its most important contacts with industry. Categorically, the secretary asserted that the government has no intention of drafting industrial plants; at the same time he denied that industry has been at all recalcitrant in offering its facilities for the manufacture of defense requirements. Timely were his explanations of how the War Department intends to interpret and apply deferrments in the drafting of men who are indispensable to factories.

Industry Found Willing to Help

IN his speech to the men who write the living history of American industry, Patterson said "In some circles there is evidently some doubt about industry's readiness to cooperate . . . The law, as finally passed by Congress, reserves for the government the right to take over recalcitrant plants which refuse orders. I am confident that the power will be seldom invoked. Such authority existed in 1917-18. It was used but twice. There is no reason to believe that it will have to invoked at all in the present armament program. On the contrary, there is every indication that industry is most willing to cooperate. No responsible official in Washington prefers governmental operation of industrial plants to private operation."

He referred to Chrysler's cooperation in undertaking the operation of a tank arsenal and, earlier, he had emphasized that every facility of Ford was being employed by Ford to assist the government in the defense program.

"Industry is not looking for great profits in the defense program," Patterson declared. "On the other hand, it does not want to incur a deficit."

Of apprehension in industrial circles about the possible depletion of man-power in industry by the induction of men into the military services, he said that the War Department wished to clarify the subject in the minds of industrialists.

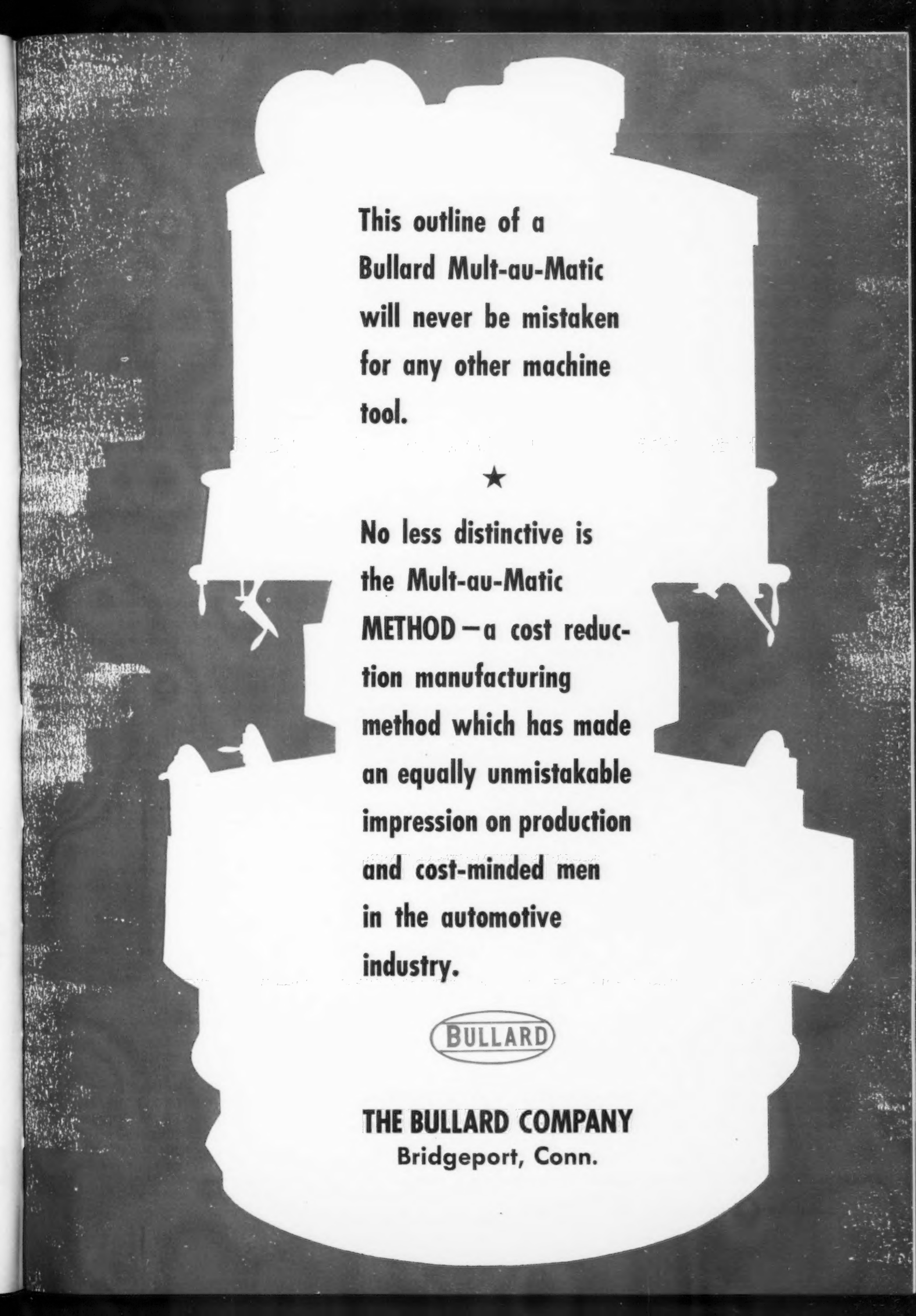
"The conception of modern warfare recognizes the vital role of the industrial effort," he explained, adding that military service of reserve officers employed in industries essential to national defense may be deferred by the War Department for a period necessary to effect their replacement. To justify a deferrment the case must meet the following conditions: (1) that the call of the officer to military duty will unduly delay the preparedness effort of the plant; (2) that he is actually and completely engaged in the occupation stated; (3) that he is competent and qualified in that capacity; (4) that a replacement is not immediately available; (5) that a replacement is necessary to the effective operation of the plant; and, (6) an estimate of the time required to secure the replacement. The employer must submit a separate letter for each individual request for deferrment.

"Men who hold commissions in the National Guard or Reserves and whose retention in essential industries engaged upon national defense contracts is absolutely necessary, may be transferred now to a War Department pool upon request by the company concerned. It must be clearly shown that the individual cannot be replaced and that his absence will seriously jeopardize production," Patterson stated. "Reserve and National Guard officers below the rank of captain and all enlisted personnel have been granted the privilege of resigning if they have one or more persons dependent solely upon them for support."

A large group of major industrialists in Detroit turned out to hear these official words from the War Office.

More Details on 1941 Models

WITH approach of the National Automobile Show, details about the new cars are being released by the manufacturers. One which attracts greatest attention is the low-priced Nash, the 600 Model. Salient features as released by the company include gasoline economy of 25 to 30 miles a gallon, "unitized" body construction, new type spring suspension with coil springs on all wheels, and a fast-accelerating, high economy power plant which has been named the "Flying Scot." Designed to reach its greatest efficiency in the range of greatest use, according to Nash engineers, the motor is highly simplified compared with other current power plants. Inlet manifolds, for instance, are cast inside the head, making it unnecessary to bolt manifolds on the outside. It develops 75


This outline of a
Bullard Mult-au-Matic
will never be mistaken
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tool.
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tion manufacturing
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impression on production
and cost-minded men
in the automotive
industry.
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hp. at 3600 rpm., a relatively low engine speed in these days of 4000 rpm. engines.

The Nash body is an all-welded steel unit on which four or five hundred pounds of weight has been saved by integral construction of the body and chassis frame.

Coil Springs On All Wheels

The car is the first low-priced American car to be sprung directly on coil springs on all four wheels. Described briefly, the Nash system, modeled after some European racers, employs kingpins 20 in. long, set vertically and supported at the top by a horizontal steel tube and at the bottom by a heavy front suspension bridge-type truss that is part of the welded steel body. A smooth collar rides up and down the lower section of each kingpin on six caged roller bearings, carrying the front wheel spindle at its lower end. Its upper end supports a resilient coil spring, which in turn carries the body weight on a tapered roller bearing. Direct-acting tubular shock absorbers operate parallel to the kingpins.

Rear suspension consists of two long coil springs with direct-acting shock absorbers mounted *inside* the coils and a deep-pressed cap acting above to absorb the vertical loads.

This new rear-end mounting arrangement requires a new type of torque tube, which performs the multiple function of driving the car and positioning the axle fore and aft. A rubber-cushioned axilizer alinement bar provides lateral cushioning.

Gives Unusual Smoothness

The suspension system which makes possible unusually low unsprung weight, practically frictionless operation and direct spring action with the wheels gives the Nash Ambassador 600 a ride of unusual smoothness.

The new front end suspension system also provides the basis for the automobile industry's only two-way ball bearing steering system, an innovation that has resulted in greater ease of control and makes possible a 33 ft. turning diameter.

New features on the 1941 Chevrolet include the use of concealed running boards and concealed hinges on all doors and trunks except on the rear deck door hinges of the coupes and cabriolets. Radiator grille stampings have been replaced with die castings and a die cast frame surrounds the radiator grille. Twice as many doorlocks will be used on the Chevrolet this year as last year, with locks now provided on both the right and left hand door.

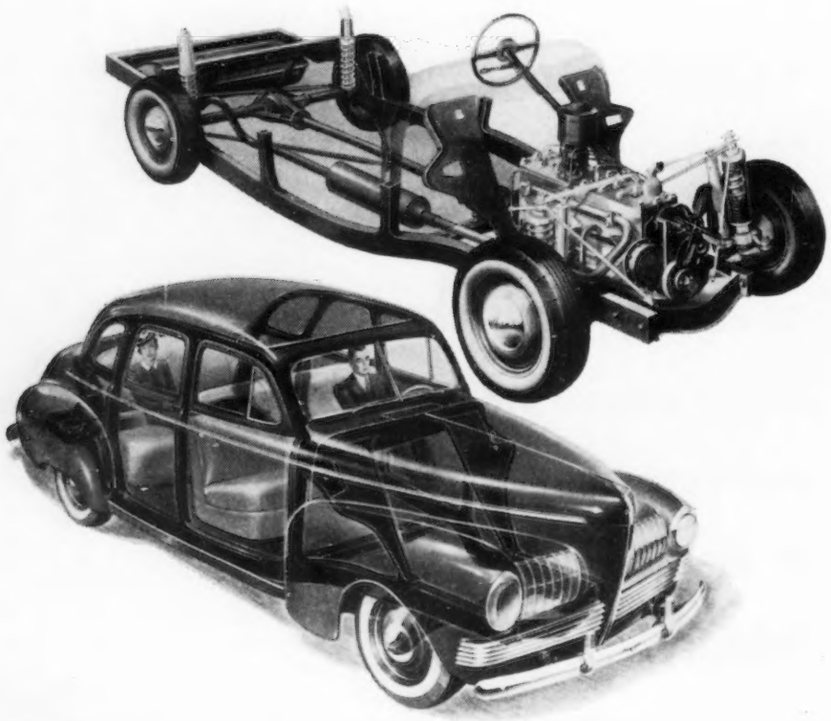
Chevrolet Horsepower Lifted

Chevrolet engine output has been upped from 85 hp. to 90 hp. which is pretty much in line with the capacity designed into this engine when it was adopted four years ago. At that time it was not possible to take advantage of the full power potential but now an increase in compression ratio and changes in combustion chamber shape have boosted the output. The piston has been changed from a crown top to a flat type and the cylinder head is revised in shape.

An innovation of interest is the provision of a reversing switch which, at each operation of the starter, reverses the direction of the current through the ignition breaker points. This tends to equalize the deposition of metal from one breaker point on the other and so prolongs the life and efficiency of the points.

Production Moving Up

Industry has opened the throttle a little bit more on automobile production moving it up toward the peak as rapidly as possible. Production last week totaled 78,820 cars and trucks, according to Wards Automotive Reports, compared with 63,240 in the previous week and 55,350 in the corresponding week of last year.



THIS picture (at top) is a phantom and cutaway view of the new low-priced Nash Ambassador 600 model, showing the equivalent of the ordinary automobile chassis. Actually there is no chassis frame in the new Nash. What is shown here is the lower portion of the "unitized" assembly which includes an integral frame and internal bridge truss construction as part of the body, eliminating between 400 and 500 lbs. of unnecessary weight. This view shows the suspension system described in the "Assembly Line" this week. The second photograph is a phantom view of the entire car. The heavy construction forward of the instrument board is particularly interesting.

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TO the iron and steel industry McKee brings a third of a century of world wide experience to protect the future of your steel plant investment.

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Washington

BY L. W. MOFFETT
Washington Editor

• New Deal economists support $20 billion lending program to finance defense, oppose economies in non-defense items and paying for defense by heavier taxes now . . . Missing steel monograph a mystery

WASHINGTON — With the November elections less than two months away, leading Administration economists are advocating a $20,000,000,000 lending program to finance the defense program in lieu of financing on a pay-as-you-go basis by levying higher taxes.

This was the gist of proposals submitted to a gathering of investment bankers, business men and industrialists last week by Government economists who advanced the idea that imposition of heavy taxes at this time would retard business recovery and hold down the anticipated increase in national income. Their suggestions, a revival of the New Deal's old theme song of spending borrowed money to bring back prosperity, was predicated on the theory that the money should be borrowed and spent by the Government with the increase tax yield going a long way toward balancing the budget.

Although both industry and Government representatives agreed that there would be no difficulty involved in borrowing money to finance the arms program through baby bonds and long-term bonds, a difference of opinion was understood to have developed over financing methods, the business representatives recommending the taxation route rather than "leaving a heavy debt for future generations to pay." On many other issues, the business spokesmen and Government experts were represented as being in rather close agreement.

How to Pay for Defense

NEW Dealers at the meeting, which was called for the purpose of discussing the subject "Exploring the Financing of National Defense and Its Consequences," were Leon Henderson, member of the National Defense Advisory Commission and the Securities and Exchange Commission; Jerome Frank, SEC chairman; Benjamin V. Cohen, member of the New Deal team of Corcoran and Cohen, and counsel for the National Power Policy Committee; Lauchlin Currie, one of President Roosevelt's administrative assistants; and Assistant Secretary of Commerce Richard Gilbert.

These Administration spokesmen put forward the arguments that:

1. The national income by 1943 would increase to over $100,000,000,000, yielding the government an estimated $17,000,000,000 in taxes.

2. The national income this year will reach an estimated $75,000,000,000 with the government receiving $5,000,000,000 in taxes. Hence by increasing the national income to over $100,000,000,000 a year, the tax yield could be tripled under present rates.

3. The national income next year will be $80,000,000,000; in 1942 about $90,000,000,000; and in 1943 about $100,000,000,000 or more; and by 1945 the tax yield on this basis would be great enough to support a $17,000,000,000 Government budget.

The forecast was made that defense expenditures will bring about certain prosperity increasing employment by 5,000,000, raising living standards and hiking prices. Government economists agreed that the defense program will involve a $20,000,000,000 expenditure during the next five years.

Other ideas advanced by the New Dealers included the statement that it would be ill-advised to impose additional taxes on consumers under present circumstances. Significantly, they insisted further that it would be impossible to effect any substantial economies in Government expenditures for non-defense items.

Some observers were inclined to scoff at the proposals, dismissing the idea as "boot-strap economics." Others, fearful of skyrocketing of prices, increased Federal control of business, more Government extravagance, and an inflated national income dependent on the armament industry, were inclined to view the news with grave concern.

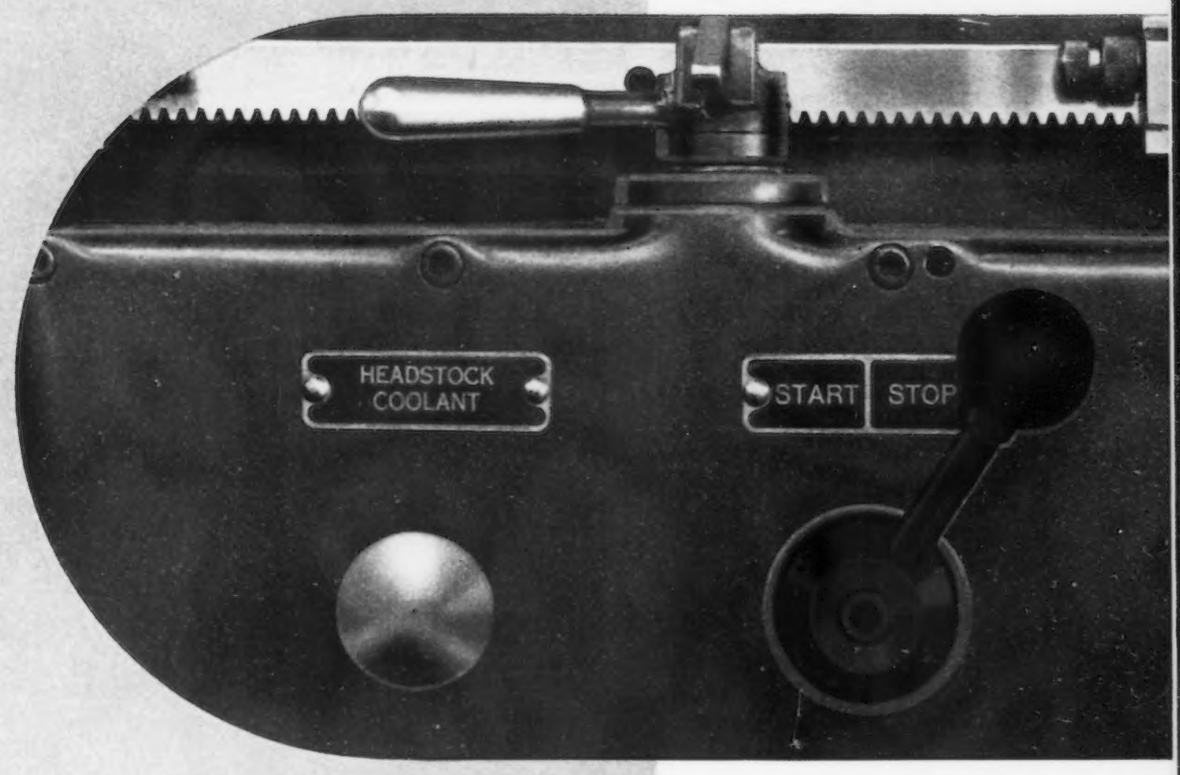
Where is the Monograph?

WASHINGTON—The mystery of the missing monograph on the steel industry has the appearance of a thrilling tale. It is hardly that. Yet something strange seems to have developed with the result that apparently there is to be no steel monograph prepared for the Temporary National Economic Committee. To speak of a "missing" monograph implies that there was one at some time. That, however, is not the sense in which the term is used here. In this instance "missing" is used to mean non-existence of something which was really reported to have existed.

For in THE IRON AGE of Aug. 29, page 69, it was stated that the TNEC monograph on the iron and steel industry had been prepared by Dr. M. G. de Chazeau of the University of Virginia, and that it was about to be sent to the government printing office. Dr. de Chazeau, an economist, was attached to the Department of Justice and had a prominent part in the department's TNEC steel study. Preparation of the monograph had been left to him.

It now develops that THE IRON AGE was unintentionally misinformed, though the source of the

You'll Never Wish FOR A THIRD HAND



You have probably made the remark, while manipulating some of the old machine tools bristling with levers—"If I had another hand . . ." You'll never hear that remark about the CINCINNATI 12" Hydraulic Universal Grinders, for they're exceptionally easy and convenient to handle. Consider this single feature, which is illustrated above:

> One lever (printed in blue), controls *three* functions simultaneously . . . starting and stopping of (1) table traverse, (2) work rotation, (3) coolant flow.

Independent controls are also provided for the operations which require them, such as truing up work held in a chuck.

There are many other features and their accruing benefits to your shop illustrated and described in our new catalog "Better Grinding in Your Toolroom", publication G-455. Write today for your copy of the booklet.

CINCINNATI 12" Hydraulic Universal Grinding Machine. Catalog G-455, illustrating and describing these machines, will be mailed on request.

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Tool Room and Manufacturing Milling Machines · Surface Broaching Machines · Centerless Grinding Machines · Cutter Sharpening Machines
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statement that the monograph had been prepared was such as to inspire complete confidence in its reliability. So no steel monograph has been prepared by either Dr. de Chazeau or anyone else. At the TNEC it was stated that preparation of the monograph was to be done by the Department of Justice. It was added that the work apparently had been crowded off the department's schedule by more pressing duties. Dr. de Chazeau, no longer with the department, is said to be on leave of absence from the University of Virginia and to be engaged by the Twentieth Century Fund in making a survey of the electric power industry.

At the Department of Justice it was stated that so far as it knows nothing has been done regarding preparation of a monograph on steel. Nor is it arranging to do anything about it. For one thing it appears to suffer from a complaint common to the monopolistic Federal bureaucracy — lack of funds. No matter how many millions may be given a government department or bureau it always finds itself short of funds and loaded with "workers" who too often have nothing important to do. For another thing the department claims there are too many other and more essential jobs to do than preparing a monograph on the steel industry.

TNEC Hasn't the Money

As for the TNEC staff it clearly does not intend to prepare the monograph. It is conceivable that, if it were "financed" by funds outside its own treasury chest, the ambitious Federal Trade Commission, which would like to take over the TNEC, would enjoy nothing more than fixing up a monograph on steel. But obviously a product of the kind coming from the FTC, with its bias against the steel industry, could not be an objective study and therefore would be of no value. The commission has entertained hostility toward the steel industry ever since it began its so-called investigation in the early '20's of the industry's basing point system and the commission's participation in the TNEC steel inquiry verged on a hysterical tirade.

The TNEC steel inquiry and hearings consumed many weeks. A thorough economic and financial dissection was made of the industry, from ore to the finished product. Executives and economists from the industry freely submitted great volumes of evidence. The inquiry into steel was easily one of the most complete and exhaustive that was presented before the TNEC. Much was made of the study and it was represented that the monograph on the industry would be an unusually comprehensive tone, analyzing the industry in all of its multiplicity of phases. Now that it appears that there will be no such monograph the effect of the TNEC's elaborate job has the appearance of staging Hamlet without Hamlet.

At present the TNEC still has plans for resuming hearings after the November elections as a final throw before the committee folds up. There does not appear to be any prospect of continuing the TNEC, as much as the FTC would like to take it over, after its two-year life ends in January when it makes its final report with recommendations to Congress. The November hearings, if they are held, are to be in the nature of a "free for all." There seems to be doubt that this show will be put on. It has been stated that the hearings really are tentative. The plan is to have a general economic discussion at which both government representatives and men from industry would participate. The FTC, never overlooking a chance for the limelight — and increased appropriations—is prepared to tell the story on steel mergers and to go into the question of ownership of industrial railroads by the steel and other industries.

More About Monographs

Getting back to the matter of monographs, the TNEC originally planned to prepare some 108 volumes. That vast number had been listed. However, it was "inventoried" and the number cut to about 60. After further trimming and revision it was finally decided to reduce the number to between 40 and 50. These monographs now are in various stages of printing and the first volumes dealing with a Department of Commerce study on "Who Pays the Taxes" and Department of Labor study on price behavior and business, either are out by this time or on the eve of being ready for distribution.

THE BULL OF THE WOODS — BY J. R. WILLIAMS

TH' PATENTS ARE APPLIED FER--YOU SEE, I AIM WITH TH' LIGHT AN' TH' RIGHT ADJUSTMENT TAKES CARE OF TH' TRAJECTORY OF TH' BULLET--I'VE SENT FOR TH' PATENTS.... NOW SAY A NIGHT BOMBER COMES OVER--I REACH BEHIND TH' DOOR AN'—
I SEE NOW WHY OFTEN A GUY CLEVER ENOUGH TO INVENT THINGS AIN'T CLEVER ENOUGH TO PUT IT OVER!
YEH, HE'S INSULTED 'EM TWICE IN A HAFF MINUTE BY LETTIN' 'EM KNOW THAT THEY CAN'T STEAL IT BECAUSE TH' PATENTS ARE APPLIED FER--HE'LL BE OUT IN A MINUTE!
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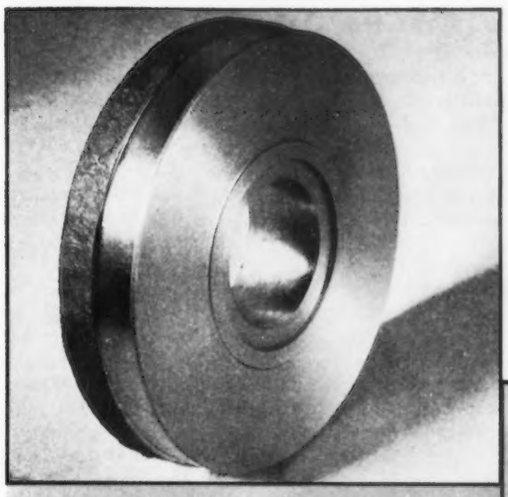
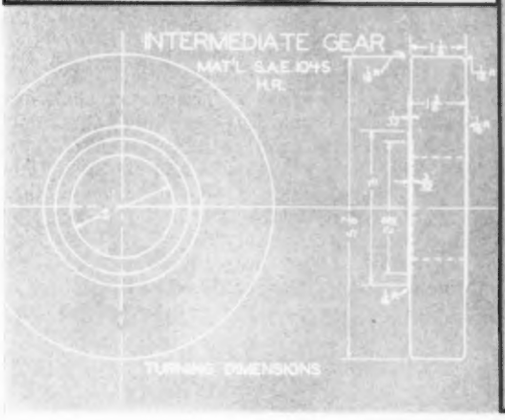
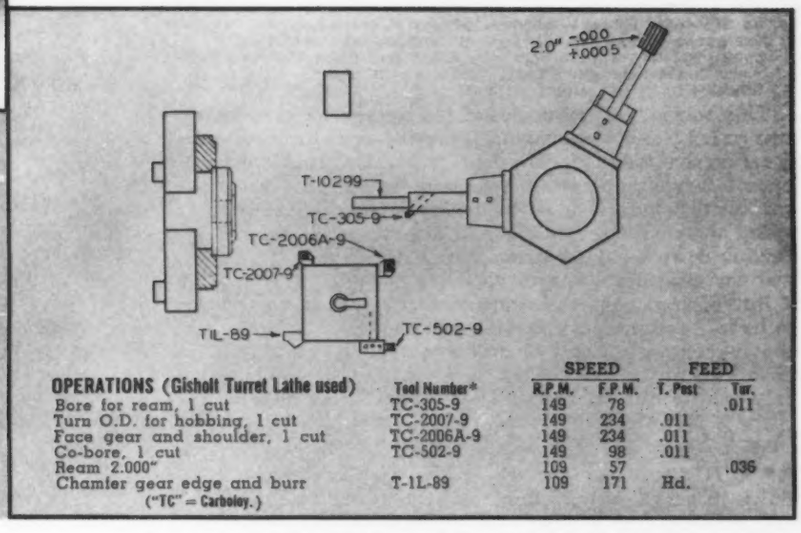
J.R. WILLIAMS 9-27



How To Cut Steel with CARBIDE TOOLS





OPERATIONS (Gisholt Turret Lathe used)	Tool Number*	SPEED R.P.M.	SPEED F.P.M.	FEED T. Post	FEED Tav.
Bore for ream, 1 cut	TC-305-9	149	78		.011
Turn O.D. for hobbing, 1 cut	TC-2007-9	149	234	.011	
Face gear and shoulder, 1 cut	TC-2006A-9	149	234	.011	
Co-bore, 1 cut	TC-502-9	149	98	.011	
Ream 2.000"		109	57		.036
Chamfer gear edge and burr	T-1L-89	109	171	Hd.	

("TC" = Carboloy.)

One of more than 1000 Carboloy tool applications at Gisholt Machine Co. — 80% of which are steel cutting.

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It describes how to provide best machine conditions for machining steel with carbides, gives you recommended tool rakes; most efficient chip breakers and a simple way to duplicate them. Helps you to select correct speeds and feeds for all types of steel. Describes use of coolants, and takes the "guess-work" out of carbide grade selection.

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Fatigue Cracks

BY A.H.DIX

There, There Now

• • • *Printers' Ink* has worked itself into a lather over the widespread use of the word *blitzkrieg*. It sermonizes:

> Somehow it seems that the use of the word ought to be limited to the loathsome events it was invented to designate. The cynically flippant applications may amuse some, but there are others who don't feel quite that way. As a matter of good taste, business interests, at least, might try to get along without it.

This brings back memories of the days when sauerkraut was called "liberty cabbage." Since the siege of Jerusalem the common language has been colored during wartime by military expressions. For years after the last war you couldn't go to a business conference that wasn't lousy with "consolidating our gains," "attaining our objective," "laying down a sales barrage," and other shafts from the war correspondents' quiver.

But after a time the exigencies of peace caused them to be laid away in mothballs—with the exception of some that were good enough to be put on full time. We could have sworn that we could reel off half a dozen, but the only one we can think of at the moment is *camouflage*.

Punch Puller

• • • *"It strains at the leash like a speedster,"* blurbs Buick in an ad introducing its 1941 model. The simile is screwy. Speedsters don't strain at leashes. Greyhounds do. Our guess is that the advertising writer followed through with the simile correctly in his original copy, and then a brass hat changed it, fearing it might give the impression that 1941 Buicks will come in only one color.

Odd Fellow

• • • Of course, there's always the chance that the brass hat was right, for one of our men was solemnly assured by a manufacturer he called on the other day that it is a mistake to buy a car of an even-year model. The '37's, '39's and '41's are all right, but look out for the inbetweens, he was told. "Yes, and always buy it in the light of the full moon," our man wisecracked. "There may be," was the response, "something in that, too."

Deceptive Monickers

• • • It was years before we discovered that Crosby Field is the president of the Brillo Mfg. Co., and not an airport. The other day a cancellation came through from Port Martin, Walla Walla, Washington. We found he is an individual, and not a place where ships dock.

He Pleads for a Muffler

• • • George Appel of Detroit writes sourly that we brag much too blatantly about your favorite family journal, an observation in which there is probably too much truth. It would be nice if we could work in the backpats without their being noticed, like the gin in a wellmade cocktail.

But some refuse to be shaken in. For instance, we have just learned that for the third consecutive year THE IRON AGE has received an award in the annual contest for editorial excellence conducted by *Industrial Marketing*, the trade papers' trade paper. As those in the business know, the awards are given for merit only and for no other consideration.

As the Greenpernt valedictorian said, pride soiges within us, and we might as well come right out and admit it.

Telephone Toll-Raisers

• • • Retailers of steel are unfortunate, it seems to us, in having their businesses known as "jobbers" or "warehouses." Neither term is exact. This has worried us for a long time, but we have refrained from bringing it up before, having nothing better to suggest. However, we now have something to offer. The same mail brings us letters from two Indian dealers in steel — Gujarat Sahitya Mandir, of Ahmedabad, and Nanhoomal Joti Persad, of Cawnpore. These firms call themselves "steel stockists."

If the American Steel Warehouse Association decides to change its name to "American Association of Steel Stockists," it will make us moderately happy, and not at all apprehensive concerning any confusion the change might cause, for we are reasonably certain that 50 years from now steel stockists will still be known as steel jobbers or warehouses. Ever since Harding was in bloom the brass hats in our line have been trying to get the customers to drop "trade paper" and use the more refined term "business paper," but nobody pays any attention.

Call Me Butch

• • • What will happen to India in the world shake-up John Gunther hasn't yet told us. But one thing is certain: to survive, India will have to rule out such soporific, time-taking firm names as Gujarat Sahitya Mandir and Nanhoomal Joti Persad. They don't go with meeting quotas, making every minute count, hitting the ball for dear old sahib, and so on. Diminutives like "Guj" or "Nan" (or "Hoomie") would help, but that probably isn't cricket.

India needs names with a positive, hard-hitting quality, as for instance, the Dodgem Corp., of Salisbury, Mass., or Bullum, Inc., Austin, Tex.

Anti-Frayer

• • • An upstate New Yorker writes:

> *Can any of your employees use a pants guard, patented? I have some to sell. They fasten inside the pants near the heel, and protect them from getting ragged. 25c. pair. Nice idea.*

No doubt. But most of us here wear high boots and tuck ours in.

Help, Help!

• • • An unexpectedly heavy demand for the issues of Aug. 22, Aug. 29, and Sept. 12 leaves us without a copy left on the shelves. If you could spare yours we would be glad to extend your subscription and pay the cost of mailing them to us at 100 East 42nd Street, New York City.

Puzzles

• • • Last week's bicycle riders are side by side in 12 min. William L. (American Can Co., Geneva, N. Y.) Crowley, H. M. Oshry, and A. D. Williams agree that if the Sept. 5 anti-aircraft gun is pointed about 84 deg. 10 min. from the horizontal the airplane will be embarrassed.

N. B. (Wm. B. Remington, Inc.) Winkless, Jr., writes:

> *Any anti-aircraft gunner who would shoot down a helpless plane like that should be strung up by the thumbs. That kite, flapping along at 100 ft./sec. or something less than 70 mi./hr., is obviously a crusted old Cub of about 50 hp., probably in the hands of a CAA student with 30 hr. in his log.*

How about puzzling a few of your 17 constant readers with the question, "Why is a given wind *always* a hindrance to a plane flying a *round* trip over *any* course?"

(1) Problems never keep up with the times. Your eight-year-old child probably gets the impression from the examples in his arithmetic book that eggs are still 15c. a dozen, steak 18c. lb., and bank interest 4 per cent. (2) Our loyal readers total 18, not 17. (3) Not being handicapped by facts, we declare flatly that the assumption in the question is wrong. A constant wind affects round trip flying time not at all. What you gain or lose going exactly balances what you gain or lose coming back.

If you can figure out in 5 min. how to draw four continuous straight lines that will pass through all of the nine circles, you were to bed early last night.

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News of Industry . . .

Public Is Too Hopeful On Defense—Knudsen

• • • **The greatest** problem faced in the national defense program is "providing tools and men," William S. Knudsen, head of the production division of the National Advisory Defense Commission, said last week in New York.

"The fact that it is generally expected that within a month or two planes, guns and ammunition will be forthcoming in quantities is deplorable," he said. "Months will have to pass before the pieces will come out. An airplane plant takes from nine to 14 months to get into operation. A machine gun factory takes from eight to 11 months and a powder mill from 10 to 12. Every machine takes machine tools, and much care must be exercised so that proper preference will be given to important items.

It still seems possible, Mr. Knudsen said, that a total production of 33,000 aircraft between last July 1 and April 1, 1942 will be attained.

Since the Defense Commission has no chairman, William H. McReynolds, the commision's secretary, presides at commission meetings, the former General Motors executive said.

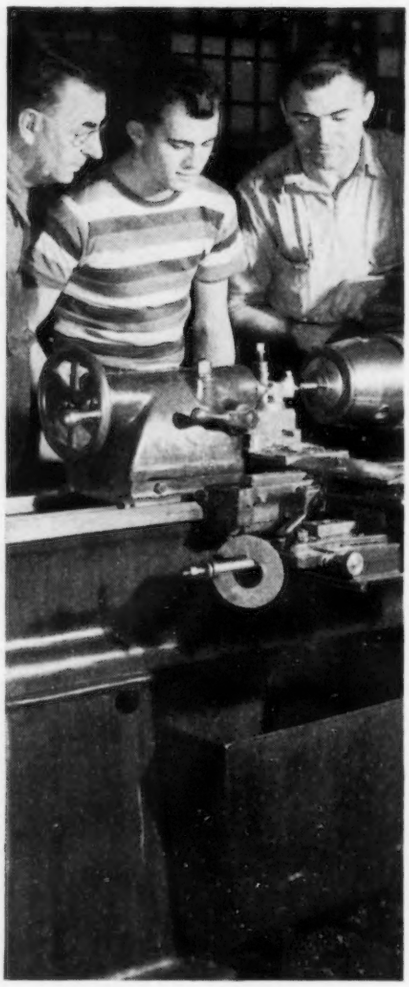
Mining Congress Warned of Possible 5th Column in NLRB

Colorado Springs

• • • **Examples** of "utterly un-American ideas" that permeated the structure of the National Labor Relations Board were cited by Edmund M. Toland, formerly general counsel for the Congressional committee investigating the NLRB in an address at the American Mining Congress held here last week. Any search for fifth columnists might very well start in the NLRB, Mr. Toland suggested.

"Close and intimate connection" existed between Mr. Smith, and Harry Bridges, west coast CIO leader, Mr. Toland claimed.

THE LATHE TECHNIQUE of Edward Koch, Jr., center below, employee of General Electric Co. at Schenectady, N. Y., is being supervised by Charles Koch, left, his grandfather, a G-E worker for 48 years, and Edward Koch, Sr., right, his father, a G-E boring mill operator 22 years.



Republic Pays $12 Dividend On Preferred

Republic Steel Corp. has declared a dividend of $12.00 per share on its 6 per cent cumulative convertible preferred stock, payable Oct. 15, 1940, to stockholders of record Sept. 30, 1940.

Navy Sets Up Board To Study Base Needs

Washington

Prompted by the huge increase authorized in naval strength, the acquisition of new bases from Great Britain and the necessity for closer government coordination with the shipbuilding industry, the Navy Department has designated an eight-man board of naval officers headed by Rear Admiral John W. Greenslade to survey the need for expansion of naval shore establishments.

Classes of shore facilities specifically earmarked for study include shipbuilding and repair, fleet, aeronautic, storage and hospital facilities; Marine Corps, ordnance and radio activities; structures for naval personnel and for other purposes.

Secretary of the Navy Frank Knox has directed that the board undertake the survey as soon as practicable, giving consideration to the changed conditions that have arisen since the Hepburn report. The Navy called it axiomatic that a 70 per cent increase in naval strength calls for a corresponding increase in the supporting shore establishments.

Changed conditions to which the new board has been directed to concentrate its efforts include acquisition of new bases from Great Britain; the present international situation; the 70 per cent increase authorized in naval strength; the development and trend of modern warfare; and the liason and coordination of private industry in shipbuilding and ship repair work.

Rails Pay $226 Millions In Taxes in 7 Months

• • • **Class I** railroads paid $226,469,224 in taxes in the first seven months of 1940, the greatest amount for any similar period since 1929, according to the Association of American Railroads.

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Rod-O-Graph, chart for calculating rapidly the quantity of rod required for making a unit of 1000 pieces of screw machine products, supplied on request. The back of this conveniently-sized card contains a table of net extras which, when added to the base price of brass rod, gives the cost of the material. *Bridgeport Brass Co.*

(2) Air Mail Stationery:

Samples and specifications of light-weight, opaque letterheads, invoices, office forms, and envelopes, will be sent to executives encircling this number on the postcard. This stationery is designed specifically to save postage on domestic and transatlantic air mail. *Lafayette Co.*

(3) Grinders:

Sectional drawings and description of 12 in. hydraulic universal grinders given in 18-page booklet, "Better Grinding in Your Toolroom." Table reversal accurate within 0.004 in. at all traverse rates, infeed mechanism for reducing diameters has increments of 0.0001 in. Hinged type internal grinding attachment can be swung out of way for external grinding, making rechucking of work unnecessary. *Cincinnati Milling Machine & Cincinnati Grinders, Inc.*

(4) Motor Controls:

Polarized field frequency synchronous motor controls diagrammed and described in publication No. 159. Function and construction of control parts explained and connections of typical controls illustrated. Compactness, simplicity, safe construction, and accurate control are features of equipment. *Electric Machinery Mfg. Co.*

(5) Liquid Level Controls:

Construction features and operating characteristics of floatless controls for conductive liquids described in bulletin No. 40. High level and low level electrodes control relay switch to maintain liquid level. Current is generated in relay and no a.c. source is required. *Bender Warrick Corp.*

(6) Travelling Cranes:

Travelling cranes in capacities up to 15 tons, with spans up to 50 ft., illustrated and described in bulletin No. 695. Single and double beam design, one, two, or three motor types, floor or cab controlled, units available. Safety, strength, accessibility, and economy are stressed. *Detroit Hoist & Machine Co.*

(7) Air Conditioning:

Simplified data on air conditioning in the form of psychrometric charts revised for greater accuracy and convenience, given in wall chart. Correction table permits accurate solution for all barometric pressures. Use of large vertical scale for grains of moisture per lb. of dry air gives accurate determinations at lower temperatures. *Carrier Corp.*

(8) Carbides:

Cemented tungsten carbides and carbide tipped tools discussed in catalog No. 40. Data on tipped reamers, lathe centers, etc., and full specifications on all standard carbide blanks, bits, and tools, given. *Super Tool Co.*

(9) Handling Equipment:

Redler material handling equipment, in both horizontal and vertical closed circuit units, described in catalog No. 140. Phantom drawings of elevation sections given. Installation views, perspectives and line drawings included. *Stephens-Adamson Mfg. Co.*

(10) Water Regulators:

Operating diagrams, performance charts, installation views, and other information on boiler feed water regulators given in bulletin No. 429. Boiler is fed automatically, according to steam flow. Can be used with operating pressures from 80 to 1325 lb. and with capacities from 15,000 to 550,000 lb. per hr. Is unaffected by changes in atmospheric conditions. *Northern Equipment Co.*

(11) Spring Washers:

Causes and remedies for bolt stretching are discussed in bulletin No. 6, dealing with causes of looseness in bolts. Helical spring washers are said to counteract the results of initial looseness, which are said to arise from causes other than backward turning of the nut upon its threads. *Kantlink Spring Washer Manufacturers.*

(12) Welded Stainless Tubing:

Tables on corrosion resistance, physical properties, tolerances, dimensions, applications, suggestions on fabrication, design, and specifications, given in data book. Economical extension of stainless tubing applications and possible reduction of operation and maintenance costs explained. *Carpenter Steel Co.*

(13) Core Conveyors:

Pneumatic core trucks, resilient core racks, core barrows, bottom-board and bag-holding trucks described in leaflet. Spring absorb gangway and threshold bumps before they reach core trays. Barrow tops are 24 in. wide, 40 in. long. Loading capacity for one-wheel model is 400 lb.; two-wheel is 700 lb. *Chicago Mfg. & Distributing Co.*

(14) Casting Cleaning:

Hydro-Blast system for cleaning castings without dust or dirt and permitting the recovery of waste sand is described with flow set-up and diagrams in bulletin No. 205. Fine stream of water containing sand is directed against casting at 1200 lb. pressure. *Hydro-Blast Corp.*

(15) Hose Masks:

Extended-vision face-pieces, for use with company line of hose masks, designed for use in places where high concentrations of gas or low oxygen content exist, described in bulletin. Non-fogging, large area lenses of laminated, shatterproof glass permit full vision through all viewing angles. Will fit any face with gas tight seal and minimum of dead air space. May be sterilized at will. *Mine Safety Appliances Co.*

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(16) Chain Castings:
Promal metal for use in cast elevating, conveying, and power transmitting chains discussed in booklet No. 1750. High ultimate strength, high yield point and fatigue strength, and resistance to abrasive wear, among claimed characteristics of metal. *Link-Belt Co.*

(17) Die Casting:
Die-casting machines incorporating several exclusive features described in 8-page leaflet. Arching beam adds rigidity and leaves sides open to work. Rotary hydraulic cylinder is directly connected with guide by one pair of heavy toggle arms which unfold in short radius with bell crank motion. Up to 1000 shots per hr. may be handled, depending on diameter of plunger used. Core-pulling is automatic. *Phoenix Machine Co.*

(18) Cold Rolled Steel:
Information, including hardness and bend tests on untempered spring steel cold rolled to various tempers, and weight tables on cold rolled and cold drawn specialty steels, given in folder. Manufacturing methods mentioned with special reference to finishing of tempered spring steels. *Crucible Steel Co. of America.*

(19) Speed Reducers:
Sectional views, selection tables, and general information on speed reducers, given in catalog No. 17-A. Advantages include choice of motors, freedom from contamination of motor windings by gear lubricants, accessibility and compactness, and ease in maintenance or replacement. Prices are included *D. O. James Mfg. Co.*

(20) Insulated Wire:
Applications and uses of Flamenol insulated wire and cable are described in leaflet GEA-2733D. A synthetic compound resembling rubber, it provides both insulation and finish, a single layer providing adequate protection for a cable conductor. High dielectric strength, elimination of protective braid for ordinary use, immunity to sunlight, oxygen, oils, solvents, acids or alkalis, and resistance to flame and moisture, are among advantages claimed. *General Electric Co.*

(21) Heating Coils:
Detailed data charts and graphs simplifying computation of selection of heating coils given in catalog AC 601. Rigid coil casings protect heat transfer core yet permit free expansion and contraction. Patented mountings maintain alignment and prevent overall expansion stresses within core. Integrated breaker-tube orifices prevent scale from lodging across openings of orifices. Fin and tube contacts permanently sealed by tin alloy highly resistant to atmospheric corrosion. *Fedders Mfg. Co., Inc.*

(22) Metal Cutting Saws:
Metal-cutting power saws described in catalog No. 51. Patented, four-sided saw frame permits use of backing-plate for support of hack saw blade, which is tensioned in center of frame. Speeds of 50, 85, and 125 strokes per min. are standard for all models. *Peerless Machine Co.*

(23) Electrodes:
Physical properties, chemical analyses, qualities, and recommended procedure for using mild steel welding electrodes, and also information on alloy steel electrodes, given in pocket-size pamphlet No. 4. High amperages may be used without undercutting and with minimum of spatter. *Metal & Thermit Corp.*

(24) Deaerating Heaters:
Brief history of development of deaerating heaters, covering causes of boiler and pipe corrosion and methods of prevention, given in bulletin No. 2357. Heater described removes all oxygen and free carbon-dioxide from water, requires no trays. Water is sprayed through non-corrodible valve through steam, heating water within three or four deg. of steam temperature. *Permutit Co.*

(25) Carbon Tool Steels:
Suggested uses and shop data for the application of straight carbon tool steels given in leaflet. Uniform case depth in hardening, regardless of section, and fine grain size over wide hardening range, are among features claimed. Temperatures for forging, annealing, hardening and drawing are given. *Allegheny Ludlum Steel Corp.*

(26) Heaters, Induction Motors:
Construction features of strip heaters, immersion heaters for water and oil, unit heaters of both forced and natural convection type, cartridge-type heaters, and thermostats, described and shown in series of bulletins. Capacitors for low-voltage applications, cast aluminum rotors for high-starting-torque, low starting-current motors from 15 to 100 h.p., and vertical, solid-shaft induction motors, described in separate bulletin series. *General Electric Co.*

(27) Paints:
A full line of paints to meet industrial requirements is described with application views in catalog No. 8. Color chart shows standard colors available. Acid, alkali, heat resisting and damp-proofing paints covered. *Skybryte Co.*

(28) Heating Machines:
Reciprocating, full muffle, clean hardening machines for continuous operation are described in bulletin No. 812. Location of mechanism outside of machine proper eliminates conveyor trouble. No trays or belts used. Work capacity ranges from small, light springs, stampings, drop forgings, etc., to heavier pieces. *American Gas Furnace Co.*

(29) Boiler, Tank Accessories:
"Boiler and Tank Accessories" is claimed to be the first publication devoted exclusively to equipment for fired and unfired pressure vessels. Manhole and cover assemblies in standard and special shapes, welded fittings, water column ells, forged flanges and gaskets illustrated with dimensions and price lists. *Steel Improvement & Forge Co.*

(30) V-Belt Drives:
New belt ratings, permitting more precise and economical selection of V-drives, given in catalog. Correct belt and sheave combinations determined quickly from data, eliminating intricate computations. *Medart Co.*

(31) Transmissions:
Compact, self-contained mechanical speed-reducing transmissions, instantly adjustable to any speed, described in booklet. Can be operated in either direction, shock or overload not affecting speed. Motor, input and output shafts are in line, making for ease of installation. Automatic or remote control can be provided. Sizes run from ⅛ to 7½ h.p. *Lenney Machine & Mfg. Co.*

(32) Cutting Tools:
Brazed and welded tip tools for cutting steel described in leaflets. Steel cutting with non-ferrous alloy containing tantalum carbide, at recommended speeds is discussed. List prices on tools and tips for brazing included. Instructions given for making tools by means of Tantung welding rod applied to steel shanks by acetylene torch. *Fansteel Metallurgical Corp.*

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British Report Krupps Blasted

• • • **Reports of damage** to German industrial plants, particularly in the Ruhr, as a result of British bombing raids are discussed in a recent issue of The Metal Bulletin, British metal trade publication. (The Sept. 19 issue of THE IRON AGE carried a dispatch from Portugal telling of dislocation of German steel plants as a result of such raids.) The Metal Bulletin says:

"R.A.F. bombers have been dealing with German industrial objectives for some months now and the damage already effected is reported to be serious. The Ruhr has received remorseless attention and amongst the iron and steel works which have been hit must be mentioned Krupps, of Essen, which has been plastered with a large number of bombs. As power stations, chemical works, oil plants and other industrial conglomerations in the same district, not to mention the great railway marshalling yard at Hamm have been heavily and regularly peppered, our nocturnal bombers are spreading their wings still wider.

"Aircraft works, including Junkers at Dessau and at Bernberg near Magdeburg, the Dornier airplane plant at Wismar and Wenzendorff, the Messerschmitt factory, the famous aircraft plant at Gotha, the Focke-Wulff works at Bremen and the Fieseler plant at Kassel, have been attacked and damaged.

"Railway junctions and other communications like the Dortmund-Ems Canal have been damaged and metal factories are also being attacked. Both Lünen and Grevenbroich in the Rhineland have been attacked; here are situated big refining plants of Vereinigte Aluminum-Werke A. G. Another aluminum plant was severely damaged the other day when the Rheinfelden Works close to the German-Swiss frontier was attacked by our bombers; the damage seems mainly to have been concentrated on new plant extensions and a high chimney was seen to collapse.

"This onslaught on the Nazi aluminum works is likely to have a serious effect on their aircraft production program. The Deutsche Metallwerke near Frankfurt-am-Main, also the Griesheim Chemical works have been bombarded."

German Concerns to Take Over Lorraine Iron and Steel Plants

Lisbon, Portugal

• • • **In Germany** a new steel corporation has been established, the Eisen & Hüttenwerke Köln A. G., which by merger of a number of smaller companies, established a corporation with about 2,700,000 tons annual steel capacity. It includes the Rasselsteiner Eisenwerksgesellschaft, the Eisen & Hüttenwerke Bochum, the Eisenhüttenwerke Thale (in the Harz) and a number of smaller ones. The corporation, however, holds also the majority of interests in the Neunkirchner Eisenwerk, formerly Stumm, the largest of the Saar works. The company has just issued a loan of 20 million marks, which will be used for works expansion. The new corporation is now fourth in importance in the steel industry of Germany and is known to be particularly interested in the reorganization of the Lorraine iron mines.

The blowing in of stacks in Lorraine has been almost completed. There are now 21 blast furnaces in operation in Lorraine, many of which, however, are slightly obsolete. As regards their structural organization, nothing definite is as yet known. The iron and steel works of Lorraine will cease to be property of the holding companies in Paris and be reincorporated into German concerns. The plan is, however, to establish two independent Lorraine iron and steel companies, which would be members of the German iron and steel cartel.

Negotiations have been completed with the Spanish Iron ore mining companies of the north of Spain. Germany has little use of the Spanish iron ores there at the moment and, exports to Great Britain dwindled to only 18,000 tons during August. Due to these circumstances, the companies are of necessity closing down more mines.

During the first half of this year, Russia received from Germany machinery worth 208 million marks; iron and steel to the value of 51.7 million marks, of which 4.6 millions represented alloy steels, wire rope and other wire products for 3.8 million marks; vessels for 5.6, aircraft engines for 2.3, motor cars, trucks and spare parts for these for 40.2 million marks, non-ferrous metal products (finished and semi-finished) for 5.6 millions and hardware products and cutlery for 6.8 million marks.

Principal Russian products which were imported into Germany: Oil, manganese and other ores, cotton, maize and other fodder, hides, skins, furs, timber, etc. The traffic is extended from Baltic and White Sea Ports (via Norwegian coast) up to the Black Sea, where a new shipping line connecting Danube ports and Russian ports had been established last winter.

Coming Events

Oct. 2 to 5—Electrochemical Society, Inc., fall meeting, Ottawa, Canada.

Oct. 7 to 11—Twenty-ninth National Safety Congress and Exposition, Chicago.

Oct. 13 to 16—American Gear Manufacturers Association, semi-annual meeting, Skytop, Pa.

Oct. 14—Society of Automotive Engineers, annual dinner, New York.

Oct. 16—Porcelain Enamel Institute, fifth annual forum, Urbana, Ill.

Oct. 17 to 19—American Society of Tool Engineers, semi-annual meeting, Cincinnati.

Oct. 21 and 22—Associated Machine Tool Dealers of America, annual convention, Dayton, Ohio.

Oct. 21 to 25—National Metal Congress, Cleveland.

Oct. 25 to 26—Foundry Equipment Manufacturers Association, annual meeting, Hot Springs, Va.

Oct. 31 to Nov. 2—Society of Automotive Engineers, national aircraft production meeting and exhibition, Los Angeles.

Latin America Faces Unfavorable Trade Balance of $125,000,000 in 1940

• • • **Because of the** disruption of normal international trade by the war, Latin America is facing the prospects of an unfavorable (to them) balance for 1940 of about $125,000,000 in their trading with the United States, according to rate of export and imports in the first nine months of the war, as reported by Department of Commerce. This figure does not include debt service which amounts to a substantial sum annually. In Argentina alone, close to $25,000,000 is needed each year to service its dollar debt.

This unfavorable balance is a severe threat to the stability of the Latin American republics and undoubtedly can not be supported very long without severe internal repercussions.

Efforts to equalize trading between Latin America and the United States is confronted not only by economic barriers, but often by ideological obstacles. In the case of Argentina, efforts to improve trade relationships have been thus far almost entirely unilateral. Actually, the United States being the least favored nation in the Argentine customs setup. Latest obstruction to furtherance of Argentine-U. S. trade is the embargo on all U. S. goods put into effect Sept. 19. Purpose of this embargo is somewhat beclouded as U. S. represents only source open to Argentina for important railroad, mining and agricultural equipment.

United States exports to Latin America in the first nine months of the war were $553,172,000, as compared with $366,791,000 in the nine months ended May, 1939. Imports for the first nine war months were $459,837,000, against $352,105,000 in the 1938-39 period. The excess of United States exports over imports rose from $14,686,000 in the nine months ended May, 1939, to $93,335,000, in the nine months ended May, 1940. The average monthly balance in favor of the United States was $1,632,000 for the 1938-1939 period, as compared with $10,371,000 monthly in the nine war months. For the entire year of 1938, the excess was only $61,602,000.

U. S. Exports to Latin America

(000 omitted)

	Six Months Ended February 1940	Nine Months Ended May 1940	Nine Months Ended May 1939
Argentina	$51,744	$81,657	$47,976
Brazil	54,917	86,046	50,296
Venezuela	37,214	55,651	38,488
Columbia	28,484	42,618	35,621
Chile	18,898	30,001	16,420
Peru	12,343	18,565	11,854
Uruguay	4,575	7,114	2,476
Ecuador	4,028	5,941	2,843
Bolivia	2,737	4,758	3,834
Paraguay	468	824	561
Mexico	48,555	71,045	52,107
Cuba	49,867	71,195	56,068
Panama	24,111	39,296	18,714
Costa Rica	6,021	8,705	5,365
Guatemala	5,190	7,543	5,746
Dominican Rep.	3,742	5,374	4,736
Honduras	3,331	5,127	4,504
Haiti	2,868	3,963	3,526
Salvador	2,619	3,804	2,812
Nicaragua	2,550	3,944	2,843
Total	$364,261	$553,172	$366,791
Summary			
Exports	$364,261,000	$553,172,000	$366,791,000
Imports	293,915,000	459,837,000	352,105,000
U. S. Favorable balance	$70,346,000	$93,335,000	$14,686,000
Average monthly excess of exports over imports	$11,724,000	$10,371,000	$1,632,000

Comparing the first nine months of the war, when the monthly excess averaged $10,371,000, with the first six months of the war, when the excess was $11,724,000 monthly (see THE IRON AGE, June 27, p. 62, and July 4, p. 71) a slight improvement is shown. United States purchases in the first six war months averaged about $49,000,000 per month, while for the first nine months this has risen to $51,000,000.

Chief gains in imports were in the vegetable products classification, but metals were also an important factor. Imports of copper from Chile for refining and reexport (to France, originally) were particularly high. Sodium nitrate imports from Chile gained 18 per cent, and manganese ore shipments from Brazil rose to 67,522,000 lb. (of contained Mn) in the nine war months from 16,176,000 lb. in the 1938-39 period. Minor gains were also shown in shipments of platinum from Columbia, industrial diamonds from Brazil and manganese and chrome ore and copper from Cuba.

Compared with the nine months ended May, 1939, the greatest gain in U. S. exports to Latin America in the first nine war months was, in metal and manufactures, valued at $66,956,000, followed by machinery and vehicles valued at $36,090,000. It is significant that the classifications which showed the largest increase are made up largely of articles which previously were important items in German and British exports.

SCRAP OLD EQUIPMENT TO OPPOSE DICTATOR STATES—HOOVER

• • • **The alternative** to reducing wages, lengthening hours of labor and lowering the standard of living in the United States to meet competitive conditions from the autocracies is to increase our industrial efficiency, Herbert Hoover said last week at Philadelphia.

"We must bring our plant equipment out of its present slump of obsolescence," he told an audience at the University of Pennsylvania bicentennial conference. We must eliminate more industrial waste motion and more waste of materials and men. We must apply every labor-saving device.

"We must remove every sort of restriction by both capital and labor which impedes or penalizes the use of better methods and better machines. We must maintain free competition so that lower costs will be passed on to the consumer at lower prices."

The United States, the former president said, "must produce more goods and services per capita of the kind we can use at the prices we can sell them at." Technological advance is essential in achieving this goal, he said. The first step is to give more support to pure science, the second, applied science research.

Strategic Material Loans Planned By RFC

Washington

• • • **The Reconstruction** Finance Corp. is authorized to make loans up to $40,000 each for the development of deposits of manganese, tungsten, nickel and other strategic and critical materials under a measure to which President Roosevelt affixed his signature last week.

Approved by the Senate on June 21 and by the House on Sept. 9, the bill earmarks $10,000,000 out of RFC funds for "the development of deposits of strategic and critical minerals and other metallic and non-metallic minerals," and for "more adequate loans for mineral developmental purposes."

The RFC heretofore has been empowered to approve Class B loans for the development of gold, silver and tin but the top limit was fixed at $20,000 on any one mining property. The measure just approved broadens the RFC power, permitting it to loan up to $40,000 or an additional $20, 000 after $20,000 has already been used if the operators can justify the additional loan.

Photo by International

GIRLS USING microscopes, shown here in the Thompson Products Co. plant at Cleveland, are pictured looking for defects in the mirror-like finish of airplane valves.

Defense Awards Heaviest in East

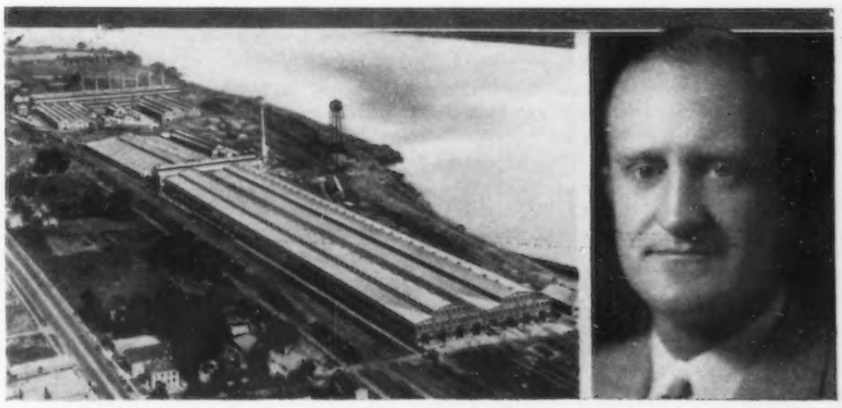
• • • **Defense contracts** have been heavily concentrated in the eastern seaboard area as a result of the predominating position of naval construction in the early phase of the national defense program, according to an analysis by the National Industrial Conference Board.

The analysis shows that 51 per cent of the value of national defense contracts awarded from June 13 to August 31, 1940 is represented by shipbuilding, 21.4 per cent by construction, 20.1 per cent by supplies and ordnance, and only 7.5 per cent by airplanes.

The geographical breakdown reveals that the greatest part of contractual defense money goes to the Middle Atlantic states, awards for this region amounting to 30.8 per cent of the value of all awards made during the period. Next largest share, 21.7 per cent, was granted to the New England region. Other sections have received the following percentages of the whole: South-Atlantic, 18.4 per cent; East-North-Central, 12.8 per cent; and the Pacific region, 12.4 per cent. The four remaining regions have received relatively negligible amounts; West-South-Central, 1.9 per cent; West-North-Central, 1.4 per cent; Mountain, 0.4 per cent; and East-South-Central 0.3 per cent.

On a state basis, Massachusetts received the largest value, $280,464,000, followed by New York, with $265,377,600; Virginia, with $259,996,600, and New Jersey with $216,936,600. These states all have important shipbuilding facilities, and naval construction made up nearly all the totals except in the case of New York, where it comprised 60 per cent of the value of contracts received.

A total of $1,000,810,899 in orders for vital defense equipment was placed in the eight days ending Sept. 17, according to the President.



A $500,000 STREAMLINING and expansion program to increase capacity at the Bettendorf Co. foundry, left, Bettendorf, Iowa, has just been announced by W. E. Bettendorf, above, vice-president and general manager. The plant's core rooms, molding and shake-out rooms will be moved and re-equipped for assembly line operation. New furnaces will be built, conveyor systems installed, and laboratories erected.

Defense May Take Million Tons of Reinforcing Steel

• • • **The national defense program** will take a large tonnage of reinforcing steel, possibly as much as 1,000,000 tons and not less than 750,000 tons, members of the Concrete Reinforcing Steel Institute were told last week at their semi-annual meeting at Skytop, Pa.

M. J. McMillan, Washington manager of the Portland Cement Association, gave a figure of $33,500,000 as the estimate of the U. S. Bureau of Labor Statistics for reinforcing steel only, covering projects for which funds have already been allocated. This was figured by mill men as about 750,000 tons. In addition, a further large tonnage will be required for projects on which details have not been fully worked out, as for example the highway program.

Presenting a survey of the purely construction phases of the national defense program, Mr. McMillan cited the following definite appropriations: Navy construction, $386,895,362; Army construction, $386,741,361; $200,000,000 earmarked for housing in the President's so-called "blank check" appropriation; $100,000,000 in an additional housing fund; $99,000,000 for the Panama Canal.

In addition to the above, Congress has passed and sent to the White House a resolution appropriating $338,263,902 for construction of buildings and acquisition of land, of which $329,519,902 is for construction purposes and $8,744,000 for land acquisition.

All of this does not take into account the huge highway program now under final consideration. Based on a survey made jointly by the War Department and the U. S. Bureau of Public Roads, which covered 75,000 miles of military roads, it is stated that 14,000 miles of roads will have to be strengthened and otherwise improved, 5500 miles which are less than 18 ft. wide will have to be widened to conform to the War Department minimum, 2000 bridges on these highways will have to be replaced or strengthened.

Industrial plant construction, which will also be in large volume, will in many instances be provided for in the funds allocated to the War and Navy Departments for ordnance. That is, the money spent for construction will be in addition to the sums specifically appropriated for that purpose, namely the combined Army and Navy total of $773,636,723.

Mill men believe that requirements of the defense program for reinforcing bars will be taken care of promptly, but, if these requirements pile up on one another too rapidly, orders for non-essential construction work may be subject to delay unless supplies can be obtained from distributers' stocks.

The next meeting of the Concrete Reinforcing Steel Institute will be held at the Homestead, Hot Springs, Va., in April or May of 1941.

The clam-shell drops its load of scrap into an acid-proof tank

Crash! goes a half ton of scrap into an acid-proof brick-lined tank — where strong, hot acid reacts with the iron to form ferrous and ferric chloride. This is the process by which one of the nation's leading chemical companies produces ferric chloride.

Twice a day for the past six years the tank has been so treated. It is just about the toughest kind of service to which an acid-proof tank lining is ever subjected. The cement in which the bricks are laid and bonded is Penchlor Acid-Proof Cement,* so strong and durable that it easily withstands even such harsh treatment as this. And it is absolutely inert to all acids except hydrofluoric.

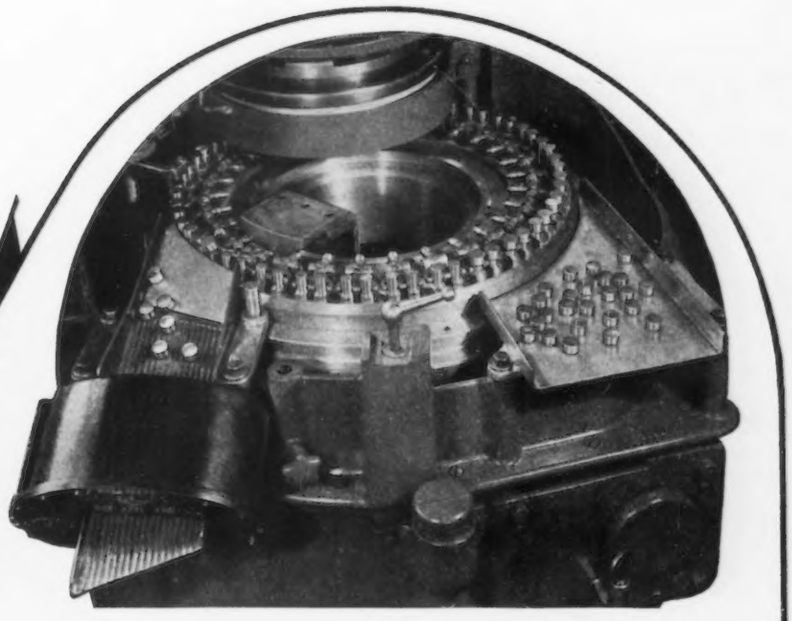
Penchlor Acid-Proof Cement is used to bond the brick lining of pickling tanks by Carnegie-Illinois Steel Corp. and other large producers. It is quick-setting and self-hardening, saving construction and maintenance time. It adheres strongly to such materials as brick, steel, carbon, glass, rubber, and lead.

For extremely abrasive conditions, unusually high temperatures or severe thermal shock, another Pennsalt product, Asplit Cement,* offers utmost durability and prevents spalling of bricks. Several large steel producers use Asplit in continuous pickling tanks operating at 210°F. Pennsylvania Salt Mfg. Co., Widener Bldg., Phila., Pa.—New York • Chicago • St. Louis • Pittsburgh • Tacoma • Wyandotte.

WRITE FOR FREE TEST KIT. You can prove the outstanding properties of these acid-proof cements for yourself, and make a convincing comparison with the product you are now using, by means of the free test kit supplied on request. Write us today on your business letterhead.

* Fully protected by *existing* patents.

PENNSYLVANIA SALT
MANUFACTURING COMPANY
Chemicals



Continuous PROFITS

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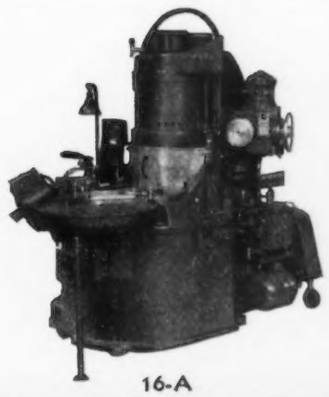
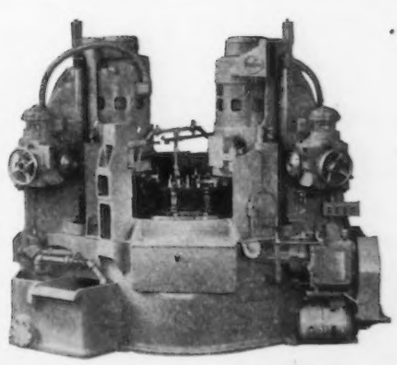
The Blanchard line of Automatic Surface Grinders has established an enviable reputation for earning profits on flat surface work produced in quantity. The No. 16-A is equipped with one wheel, and performs the following operations automatically — chucking, grinding, sizing, measuring, unloading, demagnetizing, and cleaning the chuck face. The No. 16-A2 retains all the automatic features of the 16-A, but is furnished with two wheel heads — one for roughing and one for finishing. This allows the use of a different grade wheel on each head which results in greater accuracy and production, and finer finish. The No. 16-A Dual is actually two 16-A machines in one. Work is loaded and unloaded by two operators, one on each side of the machine. This saves floor space and fixture cost. Send Blanchard full information on your flat surface work — full information on how to cut your costs will be sent gratis.



16-A

16-A2



16-A Dual

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Tin Stocks Ample For 9 to 12 Months

Washington

• • • **Tin stocks,** increased by 12,400 gross tons in August, are adequate to meet this country's requirements from nine to 12 months, Edward R. Stettinius, Jr., materials division head of the National Defense Advisory Commission, reports. On Aug. 31 there were 22,364 tons afloat and consigned to the U. S., and on Sept. 14 the Navy, the Treasury's Procurement Division and the RFC's subsidiary, the Metals Reserve Co., had bought 13,694 tons (8000 tons are already delivered) under the Government's stock pile program.

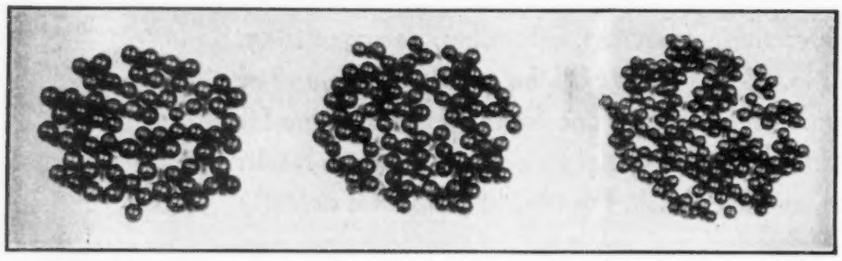
Normal U. S. consumption of 80,000 tons yearly are expected by defense board members to increase sharply when production of tin plate, solder, bearings and other tin products reaches a maximum. (Virtually all U. S. tin comes from British Malaya and the Dutch East Indies).

The defense commission has arranged for principal producers to increase mining operations. Last week the materials division and Metals Reserve Co. met private groups interested in constructing a tin smelter in this country for processing Bolivian ore. At the same time the defense board is studying possible use of substitutes and an increase in scrap recovery. Normally 7000 to 8000 tons of "clean scrap" are reclaimed each year.

Bonus Given 10,000 Deere & Co. Employees

Moline, Ill.

• • • **Approximately 10,000** employees of Deere & Co. will receive bonus payments in November amounting to 3½ per cent of the total annual wage for employees of five years service or more, and 2½ per cent of the annual wage for other workers.



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We manufacture shot and grit for endurance

A shot or grit that will blast fast with a clean finish.

This is the only reason why so many operators are daily changing to our shot and grit, from Maine to California.

The unprecedented demand for our—

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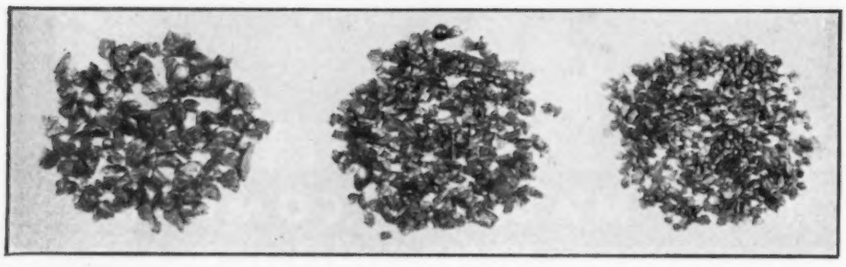
has enabled us to expand our production and maintain a quality that is more than satisfactory to our hundreds of customers all over the country.

HARRISON ABRASIVE CORPORATION

MANCHESTER, NEW HAMPSHIRE

HEAT-TREATED STEEL GRIT



Exports Nearly 30% of U. S. Steel Shipments

Chicago

United States Steel Corp.'s subsidiary companies are currently exporting between 25 to 30 per cent of their total shipments against less than 10 per cent normally, according to Irving S. Olds, chairman.

Mr. Olds, last week visited Chicago with Benjamin F. Fairless, president of United States Steel, and 10 other directors.

Tin plate operations are at 50 per cent of capacity, Mr. Fairless said. Mr. Olds stated that ingot output (now 96 per cent) could be materially increased if bessemer capacity now unused were placed in operation.

Mr. Olds added that as yet no action has been taken with reference to priorities of any kind as far as steel orders were concerned.

The corporation does not desire an increase in prices, said Mr. Fairless, unless increases in costs of raw materials make such a move necessary. The labor situation is satisfactory, he added and officials are not seriously concerned over the prospect of a shortage.

Jesse Jones, With 30 Jobs Already, Takes Another

Washington

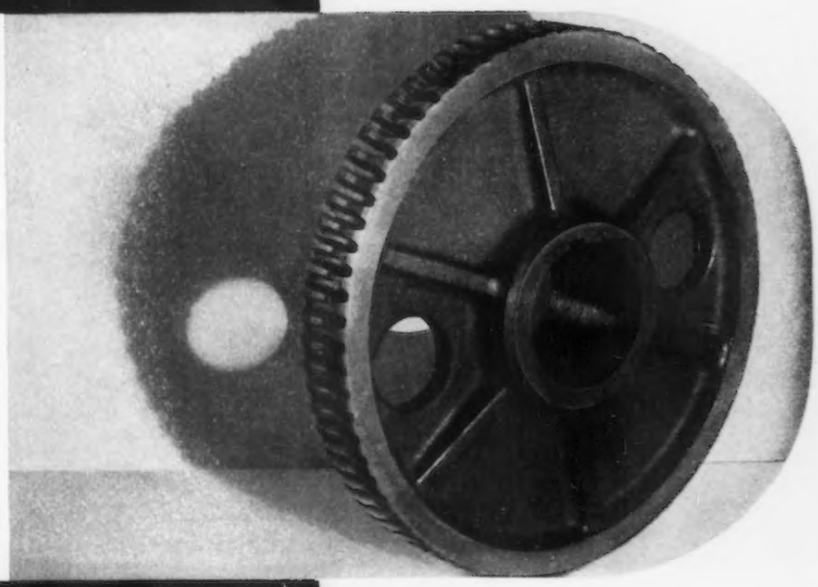
• • • **Jesse H. Jones,** who has more than 30 jobs heading government agencies, last week became Secretary of Commerce. He has loaned $14,515,352,450 in government funds. Said Mr. Jones: "The Commerce Department and the Federal Loan Administration both have to do with business. It was natural to marry them."

First Magnesium Foundry Solely For Plane Engines

• • • **Plans for construction** and equipment of what is said to be the nation's first magnesium foundry for manufacture of castings for aircraft engines were disclosed this week by G. W. Vaughan, president, Curtiss-Wright Corp. The foundry will occupy a 200 x 500 ft. building to be erected at Fairlawn, N. J.

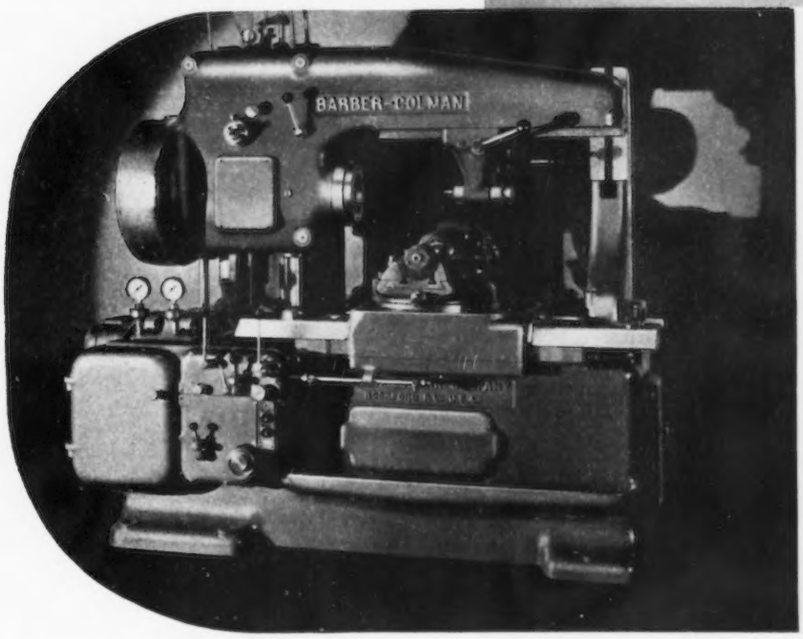
NICKEL
CAST IRONS

FOR GEARS THAT WEAR BETTER AND LAST LONGER



HIGH CARBON,

Nickel alloy, electric furnace cast iron compositions recently developed by Frank Foundries, Moline, Ill., meet all basic requirements for improved gear materials including good strength, ready machinability and wear resistance. Pictured at right is a hobbing machine gear produced from one of these special Nickel-chromium-molybdenum cast irons whose tensile strength is in excess of 40,000 lbs. per square inch and whose Brinell Hardness is approximately 240 in 1.2" sections. These alloy cast irons possess structural characteristics which assure a high degree of wear resistance combined with other properties essential to improved gear performance.



EFFECTIVE LUBRICATION

in this Barber-Colman hydraulic hobbing machine is assured by a combination of good design and the selection of suitable materials. High carbon Nickel Cast iron gears are structurally designed to assist in full lubrication and accordingly to reduce gear wear and assure quiet and satisfactory operation of a unit. Adding Nickel to cast iron induces dense grain in gear castings and markedly increases their resistance to wear.

• • •

NEW GEAR BOOK—

Write for your copy of our new publication "Modern Trends in Nickel Steel and Cast Iron Gear Materials". Available free on request.

THE INTERNATIONAL NICKEL COMPANY, INC. 67 WALL STREET NEW YORK, N. Y.

32 Companies Expand In Chicago District

Chicago

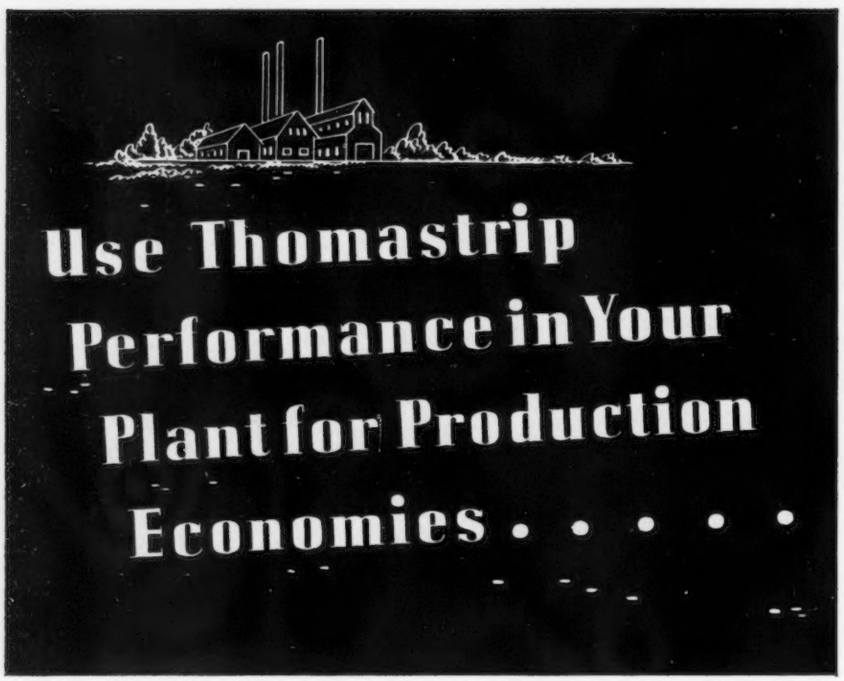
A survey conducted by the Chicago Association of Commerce reveals that during the last 30 days new industrial capital invested and developments announced in the Chicago area, have reached a total of $18,284,000. This is a record high since the month of August, 1938, when the Youngstown Sheet & Tube Co. announced a single program of $17,500,000 for its Indiana Harbor mill.

During the month, 32 Chicago concerns have announced development programs.

Among the more recent industrial expansions is a $200,000, rebuilding and expansion program for the coke plant of the Interlake Iron Corp. in South Chicago, which will include a new one-story building with special power construction for condensers. The metals refining division of the Glidden Co. at Hammond, Ind., has completed construction of a one-story $100,000 plant for the production of powdered iron.

A $100,000 plant reorganization program is underway at the American Brake Shoe & Foundry Co.'s American Forge division.

The American Stock Gear Co., busy on orders for gears for airplane and diesel engines, tractors and other industrial purposes, is moving into a new 30,000 sq. ft. factory.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The Thomas Steel Company are specialists in producing cold rolled strip steel. The organization centers its ENTIRE attention on its customers' cold strip requirements. The steels and wide range of special finishes are produced under scrupulous supervision. Through this special attention Thomastrip meets your production and product requirements so accurately that costs, production, and products are often improved.
Working samples will be furnished on request.
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COLD ROLLED STRIP STEEL
BRIGHT FINISH
UNCOATED AND
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WITH NICKEL,
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BRASS, BRONZE
THE THOMAS STEEL CO.
SPECIALIZED PRODUCERS OF COLD ROLLED STRIP STEEL
WARREN, OHIO

Fairbanks, Morse Aids Its Drafted Employees

Chicago

• • • **Fairbanks, Morse** & Co. declared last week that employees of more than one year's service with the company, if drafted into service with the United States army or called by the National Guard, will be paid an amount equal to three months regular wages less three months of government pay. Employees will retain their seniority and the right to participate in the company's employee profit sharing plan.

Inland to Pay Men Called to Training

• • • Inland Steel Co. employees called for military service will be paid a monthly amount equal to the base service pay, and will retain their seniority, the company announces. The company will maintain in effect group life insurance of such employees.

Dravo Official Warns of "Creeping Collectivism"

Pittsburgh

• • • **"Creeping collectivism"** as expounded by those who call themselves Communists, Nazis, Fascists, Socialists or New Liberals, is the greatest potential danger to our individual freedom, John S. Mason, counsel, Dravo Corp., told a meeting of the Controllers Institute of America here last week.

KEEPING PACE With The WORKHEAD

with its increased efficiency - - is a job worth the best that any small tool line can deliver.

Morse Tools have kept pace with industrial development for generations . . . supplying the necessary qualities to maintain high production.

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NEW YORK STORE: 130 LAFAYETTE ST. - - - - CHICAGO STORE: 570 WEST RANDOLPH ST.

Republic Expands to Make Armor Plate

Cleveland

• • • **Improvements just** announced by Republic Steel Corp. include the awarding of a contract for another new electric furnace at Canton, Ohio. The latest furnace will be of 50-ton capacity. Last February a new 50-ton furnace was completed at Canton. A few months ago two more 50-ton furnaces were ordered and are expected to be ready to operate in a very short time.

A good share of the company's electric furnace capacity will go into armor plate. It is estimated unofficially the company will use approximately 10,000 gross tons of electric furnace ingots a month in the production of armor plate. Other improvements include:

Cleveland — Installation of a 4-stand, 4-high, 54-in. cold mill in connection with the company's continuous mill operation. This will involve a new crane and auxiliary equipment, and will add substantially to the company's cold rolled capacity. At the strip mill, also, the company will construct additional annealing capacity together with a new warehouse and shipping building.

Youngstown—No. 4 blast furnace will be enlarged, relined and rebuilt. Included in the improvements for the furnace will be a new skip bridge, skip car, stock house, and new top. With the improvements, the furnace will have an increased capacity of about 10 per cent. Soaking pits will be improved, rebuilt and enlarged in both the open hearth and the bessemer blooming mills.

Canton—Work will begin next month on the installation of a fourth 50-ton electric furnace.

Monroe, Mich.—A 4-high, single-stand, skin pass mill, with necessary equipment, will be installed to finish coils from the Cleveland strip mill.

Gadsden, Ala.—Soaking pits in the Gulfsteel blooming mill will be improved, rebuilt and enlarged.

PARISH STAMPINGS *Travel Light*

CARLINE BRACKET — Used for connection between side posts and roof carlines in body frame construction of present type trailers.

Buses, trailers, railroad cars, and all transportation units, earn dividends through light weight construction. This is made possible by using high strength, corrosion resistance stampings.

To witness:—These brackets made by Parish are of .050" Ga. and 3/16" High Tensile Steel. They bring sturdy endurance, increased pay-load capacity to trailers.

Parish engineers can bring an added value to your product. Let us show you how.

PARISH *Specialists in* STAMPINGS *of Distinction*

PARISH PRESSED STEEL CO.
READING, PENNA.
Pacific Coast Representative
F. Somers Peterson Co.,
57 California St.,
San Francisco, California

SPRING BRACKET — For trailer, made of several pressed steel plates welded to form the assembly shown. Lighter and Stronger

Gearing Defense to Normal Business Needs a Problem

Washington

• • • **Fitting of military** requirements to industry's capacity without upsetting normal business is a broad problem requiring the National Advisory Defense Commission to be constantly alert to effects of the Commission's purchasing, Donald M. Nelson, National Defense Coordinator of Purchases said last Thursday in a radio address. Other factors than price must be taken into account to get the maximum results from the nation's human and material resources, he said.

The defense commission does not determine location of new plants and facilities (the responsibility of the Army and Navy) but is opposed to unnecessary concentrations of defense orders, Mr. Nelson said.

Canada's War Orders $20,000,000 a Week

Toronto

• • • **Contracts being placed** by the Department of Munitions and Supply on behalf of the Canadian and British governments average about $20,000,000 weekly, and in addition there are heavy demands on the steel industry to provide raw materials for various other peace-time production needs.

Fresh bookings on sheets continue on a wide scale and mills now report delivery dates on new contracts as late in first quarter or early second quarter 1941. Plate orders are running to even more distant delivery dates with all production for 1941 booked, although additional large tonnages will be made available when the new mill, under construction at Hamilton, is completed early in February. Spring steel has come into brisk demand recently with the automotive industry calling heavily for this material.

Canadian companies are reaping wide benefits from war business and reports of some 400 companies whose fiscal year ended June 30, reveal a gain in gross revenue of 14.3 per cent over the fiscal year immediately preceding, while net profits advanced 20.4 per cent and working capital 8.3 per cent.

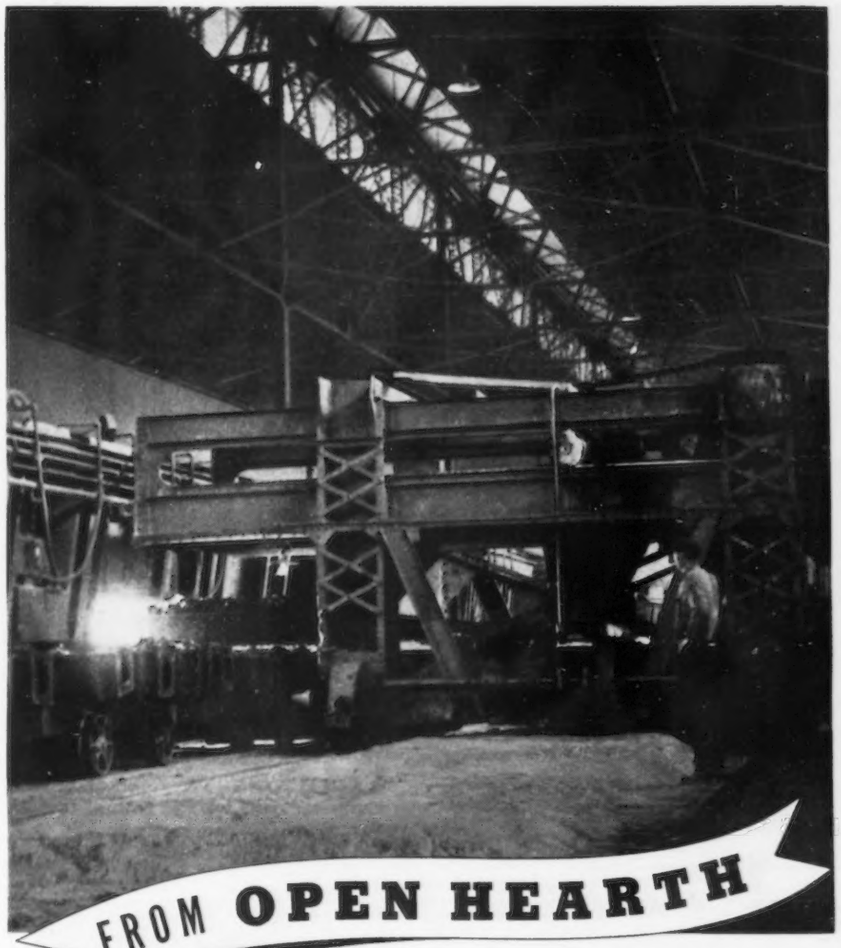
C. D. Howe, Minister of Munitions and Supply, said that more than 100 new plants or plant extensions costing approximately $225,000,000 have been contracted for on behalf of the British and Canadian governments since the war started.

Contracts placed by the Department of Munitions and Supply, Ottawa for the week numbered 1553 valued at $8,366,745.

Opposed to Powder Plant for His Town

• • • **Donald M. Nelson, Coordinator of National Defense purchases:**

"Among the hundreds upon hundreds of those who have petitioned us for new plants or facilities, only one did not request that the plant or facility be located in his home town. He was worried that it might be a powder plant and so he urged that it be located in his area but in the next town."



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Add to this the constant research and supervision of expert metallurgists and the experience of a trained personnel, and you have the story back of the high quality which Standard has maintained for more than half a century.

Standard specializes in steel castings and forgings of unusual size and design to meet your requirements.

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STANDARD STEEL WORKS

Division of THE BALDWIN LOCOMOTIVE WORKS
PHILADELPHIA

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No Politics in Defense, Alfred Sloan Pleads

Pittsburgh

• • • **The more vital** instruments of warfare today are the most highly technical products of industry, the essential program must be directed by those possessing the technical knowledge and experience to assume such a responsibility, and there is no room for the political consideration, Alfred P. Sloan, Jr., chairman, General Motors Corp., told more than 400 top flight industrialists, executives, professional people, and educators who gathered at Pittsburg's Schenley Hotel this week to celebrate the 10th anniversary of the Maurice and Laura Falk Foundation.

Speaking before Foundation members and guests, Mr. Sloan, with Dr. Harold Glenn Moulton, president, Brookings Institution, Washington, D. C., and Dr. Leo Wolman, National Bureau of Economic Research, New York, discussed in detail the present state of the nation from the economic, the price, and the labor and industrial angle. Leon Falk gave the address of welcome to the speakers and guests and J. Steele Gow, executive director of the Falk Foundation, acted as toastmaster.

Mr. Sloan charged that the demagogue type which perpetuates itself by various kinds of economic panaceas has determined the policies in this country in recent years, "The 'yes' type which determines its policies on what will please the greatest number without respect to what the greatest number need; the easiest way, in other words. And now comes the indispensable type—a milepost on the road to dictatorship," he said.

Dr. Moulton, price expert, told Foundation guests that there is little reason for assuming that an extensive rise in prices during the present American defense program is necessary.

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COMPRESSORS
As builders of high grade pneumatic apparatus for 70 years, we offer a line of Air Compressors (and accessories), suitable for varied pneumatic requirements in mill and factory. Superior design, high grade materials, skilled workmanship, combine to produce highly efficient and reliable machines that give enduring service at low operating costs ... There is one to fit your specific needs economically. Let us analyze your conditions and make recommendations. » » » » »
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A rugged machine, two-cylinder, single-stage, water-cooled, for continuous duty at 140 lbs. air pressure. Has many distinctive engineering and structural features. Sizes 46 to 157 cu. ft. Complete outfit with motor, either direct or belt drive. Separate compressor unit also available for coupling or belt drive ... Catalogue T-2055.
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INDUSTRIAL DIVISION
PITTSBURGH, PA.

Award of Merit for Articles By Hartley

• • • **An Award of Merit has been presented J. H. Van Deventer, president and editor THE IRON AGE, by *Industrial Marketing*, in its annual awards for editorial achievement. The award, made at the National Industrial Advertisers Association conference at Detroit, was based on a series of five articles on "Steel Standardization," written by A. L. Hartley, metallurgist, R. K. LeBlond Machine Tool Co.**

N.I.A.A. Warned of Post-War Problems

Detroit

• • • **Industry was told** in Detroit last week to set a pattern for its thinking and action during the current national armament program to avoid the pitfalls incident to "easy selling" in a sellers' market and to avoid or cushion the shock of post-war readjustments. Speakers appearing before the National Industrial Advertisers Association in its 18th annual Conference cited the backlog of experience earned during the last war and called on industry to strengthen itself to meet the challenge of today's world conditions.

(See page 67 for list of new officers.)

Large Tank, Ammunition Contracts Are Placed

Washington

• • • **Some of the largest** orders placed under the defense program were awarded the past week. Tank orders went to American Locomotive Co. at $32,070,000; Baldwin Locomotive Works, $33,335,500, and American Car & Foundry Co., $10,352,745. Small arms ammunition orders placed totaled $89,873,337 for Western Cartridge Co., East Alton, Ill.; $88,700,000, Remington Arms Co., Bridgeport, Conn., and $27,166,283, Savage Arms Corp., Utica, N. Y. Smokeless powder contracts included Radford Ordnance Works, Radford, Va., $24,550,000, and Indiana Ordnance Works, Charlestown, Ind., $23,050,000.

Government Contracts

Washington

• • • **Government contracts** reported for the week ended Sept. 14 by the Division of Public Contracts, Department of Labor, totaled $45,582,212, compared with $19,215,729 in the preceding week. Details of orders under $25,000 follow.

Iron and Steel Products:

Carnegie-Illinois Steel Corp. Washington, steel forgings, $213,775.
Reed & Prince Mfg. Co., Worcester, Mass., wood screws, $26,418.
Republic Steel Corp., Massillon, Ohio, steel, $41,261.
Columbian Steel Tank Co., Kansas City, Mo., liquid containers, $46,000.
Sandusky Foundry & Machine Co., Sandusky, Ohio, shaft sleeves, $119,979.
P. R. Mallory & Co., Inc., Indianapolis, Ind., shackle releases, $340,020.
Henry Disston & Sons, Inc., Philadelphia, armor plate, $68,006.
Transue & Williams Steel Forging Corp., Alliance, Ohio, connections, $221,373.
Columbus Bolt Works Co., Columbus, Ohio wedges, $32,480.
Pennsylvania Forge Corp., Philadelphia, forgings. $76,250.
Struthers Wells-Titusville Corp., Titusville, Pa., shafts, $82,362.
United States Pipe & Foundry Co., Philadelphia, cast iron pipe, $89,837.

Non-Ferrous Metals and Alloys:

Wolverine Tube Co., Detroit, Mich., condenser tubes, $34,099.
Aluminum Products Co., La Grange, Ill., coffee boilers, $11,670.
General Electric Co., Schenectady, N. Y., stranded cable, $60,282.
Walter Kidde & Co., Inc., New York City, fire extinguishers, $105,435.
Aluminum Co. of America, Washington, D. C., upper caps, $33,000.
Scovill Mfg. Co., Waterbury, Conn., body forgings, $47,575.
The Harvey Metal Corp., Chicago, Ill., body forgings, $90,030.
W. P. Fuller & Co., San Francisco, lead, $30,384.
Aluminum Co. of America, Pittsburgh, Pa., electric conductor, $45,040.
Bart Laboratories, Belleville, N. J., mirrors and molds, $604,000.

Other Machinery:

International Harvester Co., Chicago, tractors, $2,272,500.
Allis Chalmers Mfg. Co., Milwaukee, tractors, $512,346.
Allis Chalmers Mfg. Co., Milwaukee, tractors, $684,063.
William Sellers & Co., Inc., Philadelphia, planer, $32,405.
S. Morgan Smith Co., York, Pa., turbines, $763,550.
Woodward Governor Co., Rockford, Ill., governors, $70,700.
Marion Steam Shovel Co., Marion, Ohio, shovel, $60,000.
Caterpillar Tractor Co., Peoria, Ill., The National Acme Co., Cleveland, Ohio, spindle machines, $35,272.
The E. L. Essley Machine Co., Chicago, honing machine, $30,348.
A. B. Farquhar Co., Ltd., York, Pa., straightening press, $13,650.
The R. K. Le Blond Machine Tool Co., Cincinnati, boring lathes, $108,911.
Gisholt Machine Co., Madison, Wis., turret lathes, $40.297.
S. Morgan Smith Co., York, Pa., valve, $27,075.
Reed-Prentice Corp., Worcester, Mass., lathes, $111,670.
William Sellers & Co., Inc., Philadelphia, boring machine, $36,428.
Cincinnati Milling Machine & Cincinnati Grinders, Inc., Cincinnati, milling machines, $29,696.
Brown & Sharpe Mfg. Co., Providence, R. I., screw machines, $89,115.
Cincinnati Milling Machine & Cincinnati Grinders, Inc., Cincinnati, milling machines, $34,324.
Niles-Bement-Pond Co., Pratt & Whitney Div., Hartford, Conn., milling machines, $31,488.
Cincinnati Milling Machine & Cincinnati Grinders, Inc., Cincinnati, milling machines, $141,160.
Brown & Sharpe Mfg. Co., Providence, R. I., milling machines, $85,200.
Austin-Hastings Co., Inc., Cambridge, Mass., drill presses, $74,991.
E. W. Bliss Co., Brooklyn, N. Y., presses, draw, $26,600.
Wilson-Brown, Inc., New York City, honing machines, $33,832.
William Sellers & Co., Inc., Philadelphia, planers, $156,220.
Northwest Engineering Co., Chicago, shovels, $43,524.
The Buda Co., Harvey, Ill., earth boring machine, $273,744.
Ransome Concrete Machinery Co., Dunellen, N. J., concrete mixers, $41,860.
Reed-Prentice Corp., Worcester, Mass., band saws, $121,000.
The Mall Tool Co., Chicago, band saws, $121,000.
Ingersoll-Rand Co., New York City, circular saws, $91,938.
Le Roi Co., Milwaukee, Wis., air compressors, $209,920.
The Galion Iron Works & Mfg. Co., Galion, Ohio, road graders, $235,351.
Evinrude Motors, Milwaukee, outboard motors, $29,246.
Link-Belt Speeder Corp., Chicago, shovels, $302,941.
Niles Tool Works Division General Machinery Corp., Hamilton, Ohio, turning lathes, $172,500.
Indiana Ordnance Works, Charlestown, Ind., smokeless powder, $23,050,000.
Bendix Aviation Corp., Bendix, N. J., ammunition components, $10,140,000.
Ravenna Ordnance Works, Ravenna, Ohio, ammunition, $28,000,000.
Auto Specialties Mfg. Co., St. Joseph, Mich., ammunition components, $1,653,750.
Radford Ordnance Works, Radford, Va., smokeless powder, $24,550,000.
Gar Wood Industries, Inc., Detroit, artillery material, $3,784,364.
Timken Detroit Axle Co., Detroit, artillery material, $834,599.
Kennedy Van-Saun Mfg. Co., Danville, Pa., artillery material, $638,274.
Vilter Mfg. Co., Milwaukee, artillery material, $641,920.
Colt's Patent Fire Arms Mfg. Co., Hartford Conn., artillery material, $1,700,000.
Sperry Gyroscope Co., Inc., Brooklyn, fire control equipment, $6,534,920.
The American Locomotive Co., New York, tanks, $32,070,000.
Baldwin Locomotive Works, Philadelphia, Pa., tanks, $33,335,500.
American Car & Foundry Co., Berwick, Pa., tanks, $10352,745.
Western Cartridge Co., East Alton, Ill., small arms ammunition, $89,873,337.
Remington Arms Co., Bridgeport, Conn., small arms ammunition, $88,700,000.
Savage Arms Corp., Utica, N. Y., small arms material, $27,166,283.
Scripto Mfg. Co., Atlanta, Ga., ammunition components, $1,094,000.
Edward G. Budd Mfg. Co., Philadelphia, Pa., ammunition components, $2,704,026.
Scovill Mfg. Co., Waterbury, Conn., ammunition components, $1,034,000.
Budd Wheel Co., Detroit, ammunition components, $1,582,680.
Robertshaw Thermostat Co., Youngwood, Pa., ammunition components, $1,493,100.
Colorado Fuel & Iron Corp., Pueblo, Colo., ammunition components, $4,536,000.
The Crosby Co., Buffalo, N. Y., ammunition components, $1,160,000.

Personals

Change is inevitable in progressive Industry. Change is constant.

• **F. W. Werner,** who has been identified with the United States Steel Corp. and its subsidiaries since 1907, where he has been closely allied with the chemical activities of the steel industry, has been made assistant to the president in charge of coke by-product sales of all subsidiary companies of the corporation. He will make his headquarters at 71 Broadway, New York. Mr. Werner was appointed chief chemist of the central laboratory of the Illinois Steel Co. in 1925 and five years later became assistant to the late William A. Forbes, who was then in charge of coke by-product activities. He succeeded Mr. Forbes in 1936 and two years later was appointed assistant to the vice-president in charge of sales.

F. W. WERNER, assistant to the president in charge of coke by-product sales of all subsidiary companies of the United States Steel Corp.

• **R. C. Garlick,** since 1920 Chicago district manager of sales for Sharon Steel Corp., Sharon, Pa., has been appointed general manager of sales. He joined the sales force of Sharon Steel in Chicago in 1909 after receiving his formal education at Kenyon College and Colorado School of Mines. He later went to Sharon, serving as district sales manager from 1917 to 1919 and for the following two years headed the Cleveland office.

• **T. B. Daniels** has been appointed manager of the Chicago warehouse of Jones & Laughlin Steel Corp., Pittsburgh, succeeding the late M. A. Blessing. Mr. Daniels has been with Jones & Laughlin since 1919. In 1927 he was transferred to the Cincinnati office as chief clerk and in 1938 was made assistant warehouse manager at Chicago, the position he held until his present appointment.

T. B. DANIELS, manager of the Chicago warehouse of Jones & Laughlin Steel Corp.

G. F. Griffiths, who has been associated with Sharon Steel for the past two years, has been made Chicago district sales manager. He was educated at the U. S. Military Academy and Amherst College and was employed by the United States Steel Products Co. before joining Sharon.

T. F. Flynn, a member of Sharon's Chicago sales force since 1912, has been appointed assistant district sales manager in Chicago.

• **George H. Johnson** has succeeded his father, **Hobart S. Johnson,** who is now chairman of the board, as president of Gisholt Machine Co., Madison, Wis. He represents the third consecutive generation of the Johnson family to hold this position, the company having been founded by his grandfather, John A. Johnson, in 1889. **H. S. Johnson, Jr.,** has been elected a vice-president.

• **James C. Foster,** since 1938 president of the Northwestern Steel & Wire Co., Sterling, Ill., has resigned. Before affiliating with Northwestern, Mr. Foster was general sales manager of Jones & Laughlin Steel Corp., Pittsburgh, with which concern he had been associated for over 25 years.

• **Ernest L. Mawhinney,** personnel director of the Jessop Steel Co., Washington, Pa., has been ap-

JOHN E. MATEER, new assistant open hearth superintendent of Lukens Steel Co., whose appointment was announced in these columns last week.

W. RICHISON SCHOFIELD, whose appointment as director of engineering of Leeds & Northrup Co. was announced last week.

JOHN W. HARSCH, who succeeds Mr. Schofield as chief engineer of Leeds & Northrup Co.

pointed safety director for the company.

• **C. H. Schniglau** has been named assistant traffic manager of the western district for subsidiaries of the United States Steel Corp., with headquarters in Chicago.

• **Wallace W. Leipner,** heretofore identified with Arthur G. McKee & Co., Cleveland, has been made architectural engineer in charge of sales and engineering of the enameled roofing and siding division of Porcelain Steels, Inc., Cleveland.

• **Daniel E. Igo,** formerly associated with the alloy sales division of Lukens Steel Co., Coatesville, Pa., has joined the Graver Tank & Mfg. Co., Inc., East Chicago, Ind., as sales and promotion engineer, with headquarters at 424 Madison Avenue, New York.

• **Paul C. Lewis** has been made sales representative of the newly-opened office of Globe Steel Tubes Co., Milwaukee, at 1033 Broad Street Station Building, Philadelphia.

• **M. D. Bensley,** who has covered the Pittsburgh district for the past 10 years for the Shenango-Penn Mold Co., Dover, Ohio, has been made assistant to **H. S. Bradley,** president of the company. **H. H. Zollar,** who has been connected with the company since 1926, will succeed Mr. Bensley in Pittsburgh.

• **C. S. McDowell,** formerly shipbuilding consultant for Consolidated Steel Co., Los Angeles, has been made president and general manager of the Enterprise Foundry Co. and also of its engine and oil burner divisions, San Francisco. He succeeds **Charles Hoehn,** who has been made chairman of the board. Previously Mr. McDowell was manager of the Pearl Harbor Navy Yard.

• **W. S. Fernholz** has been made sales representative for the Detroit Rex Products Co., Detroit, with headquarters in Chicago. He will supervise sales in Illinois, Missouri, Wisconsin, Iowa, and the Dakotas. **L. Camel,** with headquarters at the Cleveland office, will supervise the states of Ohio, Kentucky, West Virginia, western Pennsylvania and western New York.

• **R. L. Hibbard,** formerly identified with the New York office of Cutler-Hammer, Inc., Milwaukee, has been appointed to the merchandising sales staff of the Detroit office. He joined the company in 1936 after his graduation from Cornell University.

• **J. S. Diefenbach** has joined the sales force of L. Heres De Wyk & Co., engineers, Ansonia, Conn.

• **Richard P. Dodds,** of Truscon Steel Co., Youngstown, was elected president of the National Industrial Advertisers Association at its annual meeting in Detroit last week. Vice-presidents elected were: **E. J. Goes,** Koehring Co., Milwaukee; **H. V. Mercready,** Magnus Chemical Co., Garwood, N. J.; **Terry Mitchell,** Frick Co., Waynesboro, Pa.; **W. D. Murphy,** Sloan Valve Co., Chicago; **L. J. Ott,** Ohio Brass Co., Mansfield, Ohio; **R. T. Reinhardt,** California Corrugated Culvert Co., Berkeley, Cal. **E. C. Howell,** of the Carboloy Co., Detroit, was elected secretary-treasurer.

• **S. C. DuTot** has been promoted to the post of division manager in charge of all sales activities in the Birmingham, Pittsburgh, Cleveland and Detroit areas for Electro Metallurgical Sales Corp., New York. He will continue to maintain headquarters in Pittsburgh. **E. E. Wright** will be in charge of the Cleveland office as district manager, and **F. H. Hanson** will handle sales and service activities in the Southeastern States, with office in Birmingham.

• **W. E. Remmers** has been appointed division manager of the Electro Metallurgical Sales Corp., with headquarters at the Chicago office and will be in charge of sales activities in the Middle West, including all that territory east of the Rocky Mountains.

• **R. E. Brown** has been appointed to a similar post on the Pacific Coast, including all that territory west of the Rocky Mountains. He will continue to maintain his office at San Francisco.

• **Harold E. Hughes,** vice-president of the United States Steel Corp., has been made chairman of the iron and steel division of the Committee for the Care of European Children, Inc., New York.

Obituary

• **S. Everett Sproul,** president of the Penn Steel Castings Co., Chester, Pa., died at his home in that city on Sept. 18, aged 78 years.

• **Philip M. Patterson,** New England representative for the Torrington Mfg. Co., Torrington, Conn., died at his home in West Roxbury, Mass., on Sept. 2.

The Iron Age Comparison of Prices

Advances Over Past Week in Heavy Type; Declines in Italics

	Sept. 24, 1940	Sept. 17, 1940	Aug. 27, 1940	Sept. 26, 1939
Flat Rolled Steel: (Cents Per Lb.)				
Hot rolled sheets	2.10	2.10	2.10	2.00
Cold rolled sheets	3.05	3.05	3.05	3.05
Galvanized sheets (24 ga.)	3.50	3.50	3.50	3.50
Hot rolled strip	2.10	2.10	2.10	2.00
Cold rolled strip	2.80	2.80	2.80	2.80
Plates	2.10	2.10	2.10	2.10
Tin and Terne Plate: (Dollars Per Base Box)				
Tin plate	$5.00	$5.00	$5.00	$5.00
Manufacturing ternes	4.30	4.30	4.30	4.30
Bars and Shapes: (Cents Per Lb.)				
Merchant bars	2.15	2.15	2.15	2.15
Cold finished bars	2.65	2.65	2.65	2.65
Alloy bars	2.70	2.70	2.70	2.70
Structural shapes	2.10	2.10	2.10	2.10
Wire and Wire Products: (Cents Per Lb.)				
Plain wire	2.60	2.60	2.60	2.60
Wire nails	2.55	2.55	2.55	2.40
Rails: (Dollars Per Gross Ton)				
Heavy rails	$40.00	$40.00	$40.00	$40.00
Light rails	40.00	40.00	40.00	40.00
Semi-Finished Steel: (Dollars Per Gross Ton)				
Rerolling billets	$34.00	$34.00	$34.00	$34.00
Sheet bars	34.00	34.00	34.00	34.00
Slabs	34.00	34.00	34.00	34.00
Forging billets	40.00	40.00	40.00	40.00
Wire Rods and Skelp: (Cents Per Lb.)				
Wire rods	2.00	2.00	2.00	1.92
Skelp (grvd.)	1.90	1.90	1.90	1.90

The various basing points for finished and semi-finished steel are listed in the detailed price tables, pages 81 to 89 herein.
On export business there are frequent variations from the above prices. Also in domestic business, there is at times a range of prices on various products, as shown in our detailed price tables.

	Sept. 24, 1940	Sept. 17, 1940	Aug. 27, 1940	Sept. 26, 1939
Pig Iron: (Per Gross Ton)				
No. 2 fdy., Philadelphia	$24.84	$24.84	$24.84	$24.84
No. 2, Valley furnace	23.00	23.00	23.00	23.00
No. 2, Southern Cinc'i	23.06	23.06	23.06	23.06
No. 2, Birmingham	19.38	19.38	19.38	19.38
No. 2, foundry, Chicago†	23.00	23.00	23.00	23.00
Basic, del'd eastern Pa.	24.34	24.34	24.34	24.34
Basic, Valley furnace	22.50	22.50	22.50	22.50
Malleable, Chicago†	23.00	23.00	23.00	23.00
Malleable, Valley	23.00	23.00	23.00	23.00
L. S. charcoal, Chicago	30.34	30.34	30.34	30.34
Ferromanganese	120.00	120.00	120.00	100.00

†The switching charge for delivery to foundries in the Chicago district is 60c. per ton. ‡For carlots at seaboard.

Scrap: (Per Gross Ton)				
Heavy melting steel, P'gh.	$20.50	$20.25	$18.75	$23.25
Heavy melt'g steel, Phila.	20.625	20.625	20.00	22.50
Heavy melt'g steel, Ch'go	**19.75**	19.50	18.50	19.25
Carwheels, Chicago	20.25	20.25	18.75	17.75
Carwheels, Philadelphia	**22.75**	22.25	21.25	20.50
No. 1 cast, Pittsburgh	20.25	20.25	19.75	23.25
No. 1 cast, Philadelphia	22.25	22.25	22.25	22.50
No. 1 cast, Ch'go (net ton)	17.75	17.75	17.25	17.75
Coke, Connellsville: (Per Net Ton at Oven)				
Furnace coke, prompt	$4.75	$4.75	$4.75	$4.75
Foundry coke, prompt	5.25	5.25	5.25	5.50
Non-Ferrous Metals: (Cents Per Lb. to Large Buyers)				
Copper, electro., Conn.*	**12.00**	11.50	11.00	12.00
Copper, Lake, New York	**12.00**	11.50	11.00	12.125
Tin (Straits), New York	**50.25**	50.05	50.625	70.00†
Zinc, East St. Louis	**7.25**	6.85	6.50	6.25
Lead, St. Louis	**4.85**	4.75	4.75	5.35
Antimony (Asiatic), N. Y.	16.50	16.50	16.50	14.00

*Mine producers only. †Nominal.

Composite Prices

	FINISHED STEEL	PIG IRON	SCRAP STEEL
Sept. 24, 1940	2.261c. a Lb.	$22.61 a Gross Ton	$20.29 a Gross Ton
One week ago	2.261c. a Lb.	$22.61 a Gross Ton	$20.13 a Gross Ton
One month ago	2.261c. a Lb.	$22.61 a Gross Ton	$19.08 a Gross Ton
One year ago	2.236c. a Lb.	$22.61 a Gross Ton	$21.67 a Gross Ton

	FINISHED STEEL High	FINISHED STEEL Low	PIG IRON High	PIG IRON Low	SCRAP STEEL High	SCRAP STEEL Low
1940	2.261c., Jan. 2	2.211c., Apr. 16	.....	.....	$20.13, Sept. 17	$16.04, Apr. 9
1939	2.286c., Jan. 3	2.236c., May 16	$22.61, Sept. 19	$20.61, Sept. 12	22.50, Oct. 3	14.08, May 16
1938	2.512c., May 17	2.211c., Oct. 18	23.25, June 21	19.61, July 6	15.00, Nov. 22	11.00, June 7
1937	2.512c., Mar. 9	2.249c., Jan. 4	23.25, Mar. 9	20.25, Feb. 16	21.92, Mar. 30	12.92, Nov. 10
1936	2.249c., Dec. 28	2.016c., Mar. 10	19.73, Nov. 24	18.73, Aug. 11	17.75, Dec. 21	12.67, June 9
1935	2.062c., Oct. 1	2.056c., Jan. 8	18.84, Nov. 5	17.83, May 14	13.42, Dec. 10	10.33, Apr. 29
1934	2.118c., Apr. 24	1.945c., Jan. 2	17.90, May 1	16.90, Jan. 27	13.00, Mar. 13	9.50, Sept. 25
1933	1.953c., Oct. 3	1.792c., May 2	16.90, Dec. 5	13.56, Jan. 3	12.25, Aug. 8	6.75, Jan. 3
1932	1.915c., Sept. 6	1.870c., Mar. 15	14.81, Jan. 5	13.56, Dec. 6	8.50, Jan. 12	6.43, July 5
1931	1.981c., Jan. 13	1.883c., Dec. 29	15.90, Jan. 6	14.79, Dec. 15	11.33, Jan. 6	8.50, Dec. 29
1930	2.192c., Jan. 7	1.962c., Dec. 9	18.21, Jan. 7	15.90, Dec. 16	15.00, Feb. 18	11.25, Dec. 9
1929	2.236c., May 28	2.192c., Oct. 29	18.71, May 14	18.21, Dec. 17	17.58, Jan. 29	14.08, Dec. 3

Based on steel bars, beams, tank plates, wire, rails, black pipe, sheets and hot-rolled strip. These products represent 85 per cent of the United States output.

Based on average for basic iron at Valley furnace and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Southern iron at Cincinnati.

Based on No. 1 heavy melting steel scrap quotations to consumers at Pittsburgh, Philadelphia and Chicago.

Summary of the Week

· Shell steel inquiries total 200,000 to 300,000 tons . . . Other defense requirements expanding . . . Pig iron orders and shipments show gains . . . Railroad car buying largest for one week since last fall . . . Scrap prices move slightly higher.

INQUIRIES for shell steel totaling 200,000 to 300,000 tons, the largest so far under the national defense program, will develop into orders some time in October. Two inquiries, each for 100,000 tons, are current in the Chicago and Pittsburgh ordnance districts and a like quantity is understood to be pending in eastern ordnance districts. In addition to these requirements for our own program, a British order for 12-in. shells, placed with an easten company, will call for about 20,000 tons of steel.

The Chicago and Pittsburgh inquiries are almost identical in specifying steel for five sizes of shells—155 mm., 105 mm., 90 mm., 75 mm. and 3-in. AA. The Chicago inquiry covers contracts for 1,703,000 shells. There is also an inquiry for steel for an undisclosed quantity of 500-lb. demolition bombs.

National defense activities are producing an increasing number of inquiries and orders in other directions. Ordnance contracts totaling nearly $450,000,000, which were announced by the National Defense Advisory Commission late last week, will not in most instances be reflected in steel orders for some months except for building construction, some of these projects figuring in this week's fabricated structural steel awards, which total 42,000 tons, mainly defense manufacturing plants. Largest lettings are 6700 tons for the Chrysler Corp.'s tank plant at Centerline, Mich.; 6210 tons for an ordnance plant at Charlestown, Ind., for E. I. du Pont de Nemours & Co.; 2600 tons for the Grumman Aircraft Engineering Co. plant at Bethpage, N. Y.; 1500 tons for machine shop extensions for the Mesta Machine Co., Pittsburgh; 1450 tons for Navy hangars at San Diego, Cal.; 1390 tons for barracks at Quonset Point, R. I., for the Navy. Among structural inquiries is 2000 tons for a naval ammunition depot at Hawthorne, Nev.

NOTWITHSTANDING the heavy orders being received by mills for structural shapes, many of the independent structural fabricators are operating at not more than 50 per cent, as a great deal of the shape tonnage is being used at shipyards. At a meeting of the Concrete Reinforcing Steel Institute it was estimated that the defense program will take from 750,000 to 1,000,000 tons of reinforcing steel over approximately 18 months.

Whether the heavy requirements of the defense program, combined with normal requirements, will necessitate increases in steel-making capacity is a moot question. The opinion of steel company managements is that no additions to open hearth capacity will be required provided orders are not too heavily concentrated. The only serious bottleneck thus far is in electric furnace steel, the supply of which is to be further augmented by an additional 50-ton furnace to be installed by Republic Steel Corp. at Canton, Ohio, two of similar type having been ordered a few months ago. About 10,000 tons a month of the company's electric furnace output will go into armor plate, chiefly for tanks.

The question of a possible shortage of coke, which thus far has not been more than a threat, has been stressed by pig iron sellers. Not until the past week or two has pig iron begun to share the business improvement long apparent in steel, but orders and shipments this month have increased sharply. Additional blast furnace capacity is being employed and more coke ovens in the beehive field at Connellsville have been put in service.

STEEL ingot production, though possibly headed for higher ground when orders become more evenly distributed as to plants and products, is stationary this week at 93 per cent. Gains in some districts are balanced by losses elsewhere.

Railroad buying promises to add to steel backlogs. Freight car purchases totaling 6640 are the largest in one week since the heavy buying movement of last fall. The Southern Pacific ordered 3000, Union Pacific 1000, Pittsburgh & Lake Erie 1000, Norfolk & Western 1000, Pere Marquette 600, Duluth, Mesabi & Iron Range 40. Two rail orders totaling about 125,000 tons are expected soon and others will probably follow.

Automotive steel specifications are heavier, bringing an improvement in aggregate sheet orders. Tin plate operations are not over 41 per cent and may go lower. Heavy inventories of manufactured cans and tin plate, reduced shipments of cans caused by delayed maturing of food packs and light exports are responsible.

The embargo on United States goods by the Argentine will not affect shipments for which licenses have been granted, but has halted all pending negotiations.

Scrap prices continue to move higher, though in smaller jumps. THE IRON AGE scrap composite price is up 16c. to $20.29.

The Industrial Pace . . .

INCREASED OUTPUT in all industries covered by The Iron Age index of capital goods activity raised the index 6.1 points to 103.8 for the week ended Sept. 21, the highest point the index has attained since the fourth week of December, 1939, and only 1.2 points below the 1939 peak established in the week ended Dec. 9. The index for the past week compares with 97.7 two weeks ago and 87.5 a month ago. The figure for the corresponding week in 1939 is 88.0, and for 1929, 112.7. The 1929 peak was 130.3, recorded in April.

With steadily expanding production, the automobile industry was the heaviest contributor to the week's advance in the index, this component rising 24.7 points to 99.2, highest index position since the week ended March 16, when 100.4 was recorded during the spring production peak. In the comparable week of 1939 the automotive component stood at 101.8. Physical output in the past week was 78,820 units, as compared with 63,240 in the previous week, and 23,732 four weeks ago.

Temporary military housing facilities totaling $45,000,000 lifted the heavy construction component index to 99.0 from 96.0. Total dollar volume of heavy engineering construction contracts awarded was $120,809,000, the third largest total recorded for the year. The previous week's total was $68,705,000, and that of a year ago $63,348,000. Although public awards rose to $94,123,000 from $35,936,000 in the previous period, private projects fell from $32,769,000 to $26,686,000. Among larger contracts awarded during the week was $5,000,000 for shipways at Seattle, $2,000,000 for a cigarette paper plant in North Carolina, and $1,250,000 for a power plant superstructure at Macon, Ga.

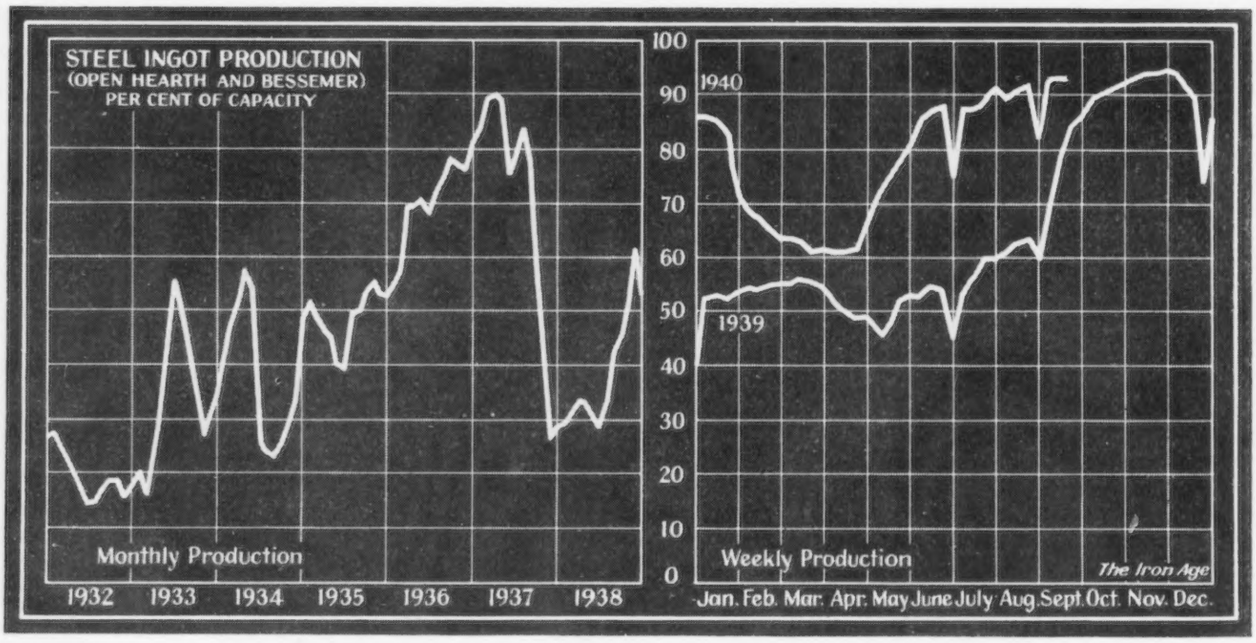
ACTIVITY IN THE Pittsburgh district recovered quickly from the Labor Day letdown, the index standing this week at 112.9, the highest level since the last week in January, and comparing with 110.7 in the week previous. The present year's peak was established in January.

The increase in steel production in the past week was less than the seasonal trend and, after application of the seasonal correction, the index of this series showed a minor loss. In view of the present exceptionally high rate of steel making, large increases in the future are not probable and fluctuating movements in the index due to seasonal corrections are likely to be fairly frequent.

Reflecting the higher tempo of general industrial activity, freight car loadings so far this month are running slightly above the August level. Average weekly loadings for the first two weeks of this month were approximately 750,000 cars, as compared with an average of less than 744,000 in August. Total September carloadings will show a slight drop from August levels, but this is due to the fact that August had five weeks, while September has only four.

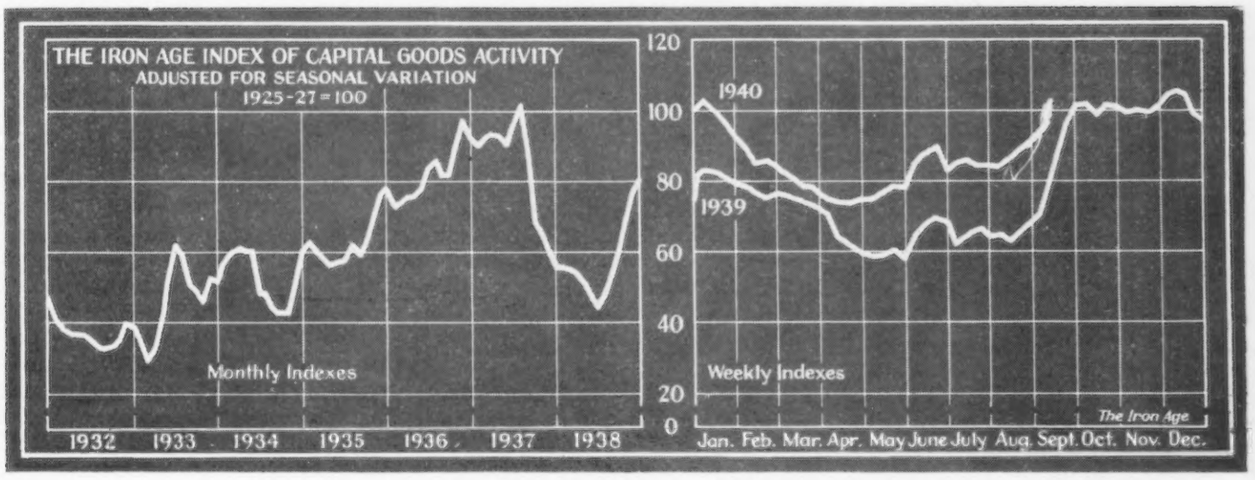
Demands from England for steel from this country to support her war efforts was the chief influence in raising export shipments of steel products, exclusive of scrap, in July to a new peak. The September export movement was equal to 14 per cent of the month's total ingot output, with England taking 53 per cent of all exports.

Ingot Output Unchanged at 93%



District Ingot Production, Per Cent of Capacity		Pitts-burgh	Chicago	Valleys	Phila-delphia	Cleve-land	Buffalo	Wheel-ing	Detroit	Southern	S. Ohio River	West-ern	St. Louis	East-ern	Aggre-gate
	Current Week..	90.0	96.0	90.0	93.0	87.0	104.5	104.0	100.0	105.0	105.0	69.0	93.5	74.0	93.0
	Previous Week..	88.0	98.0	92.0	93.0	86.5	104.5	104.0	100.0	105.0	96.5	69.0	93.5	71.5	93.0

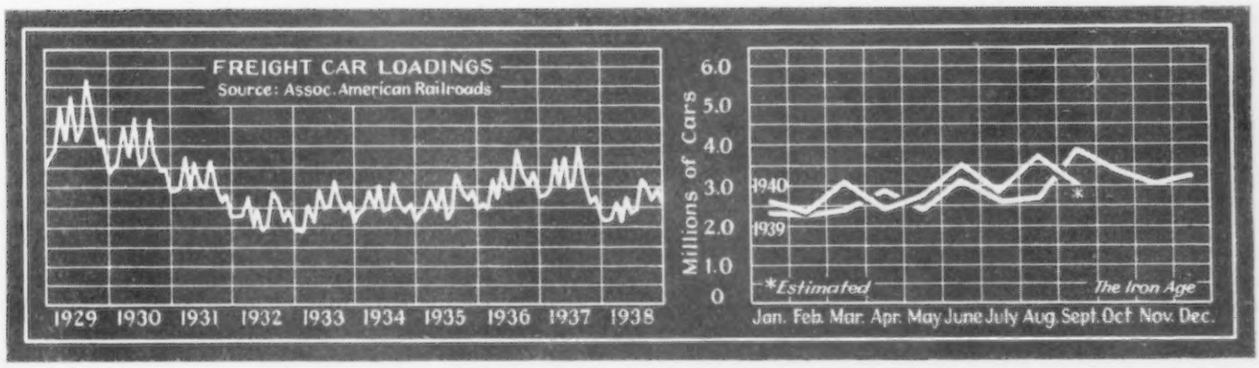
Capital Goods Index Highest Since Last December



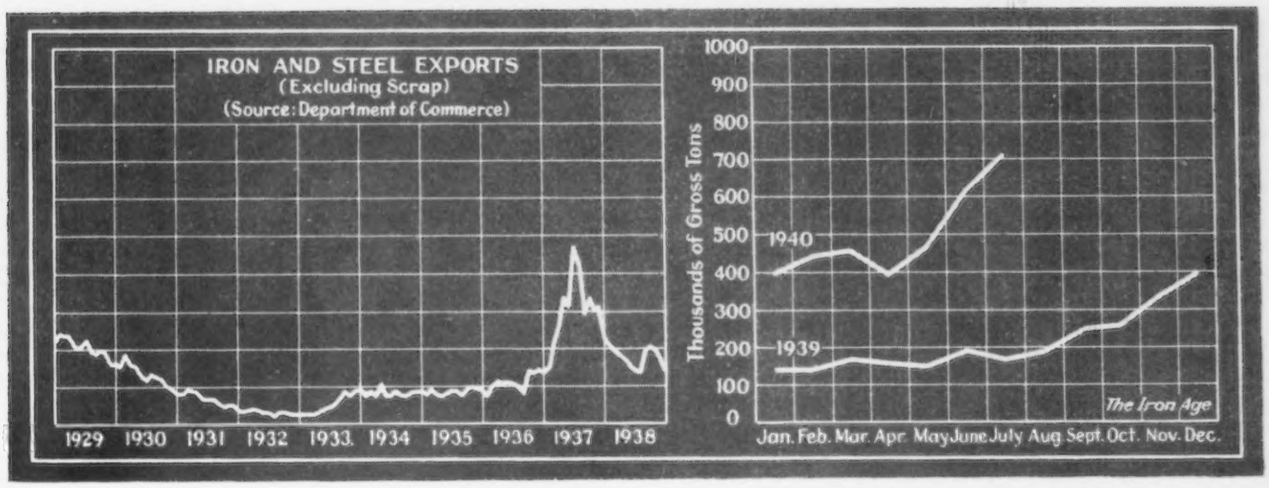
Component — Week Ended ➤	Sept. 21	Sept. 14	Aug. 24	Sept. 23 1939	Sept. 21 1929
Steel ingot production[1]	135.8	137.5	135.4	114.7	114.4
Automobile production[2]	99.2	74.5	29.0	101.8	113.1
Construction contracts[3]	99.0	96.0	99.3	69.1	103.5
Forest products carloadings[4]	72.2	69.6	65.0	62.8	111.9
Pittsburgh output and shipments[5]	112.9	110.7	108.6	91.8	120.6
COMBINED INDEX	103.8	97.7	87.5	88.0	112.7

Sources: [1] THE IRON AGE; [2] Wards Automotive Reports; [3] *Engineering News-Record;* [4] Association of American Railroads; [5] University of Pittsburgh. Indexes of forest products carloadings and activity in Pittsburgh area reflect conditions as of week ended Sept. 14. Other indexes cover week of Sept. 21.

September Weekly Freight Movement Surpasses August



War Demand Boosts Steel Export Shipments



Market News

. . . THE WEEK'S ACTIVITIES IN IRON AND STEEL

New Business

. . . Incoming orders show greater diversification

Total steel specifications at PITTSBURGH so far this month compare favorably with the volume booked a month ago. Export demand, especially from the British, is as heavy as a month ago and while the total domestic tonnage is no larger, there appears to be a greater diversification in the number of orders. The district is expected soon to benefit substantially from rail orders which will be allocated about a month or so sooner than was the case a year ago, owing to the tightness in steel schedules. Structural steel demand is the heaviest at PITTSBURGH, with plates and bars following a close second and third.

Orders for shell steel totaling 200,000 to 300,000 tons are expected to be placed shortly. In the CHICAGO ordnance district bids have been submitted on 100,000 tons, for which orders probably will be placed in October, while in Pittsburgh a similar quantity probably will be ordered next month. It is also understood that inquiries totaling 100,000 tons or more are pending in Eastern ordnance districts. In addition, a New York company which has received a new contract for 12 in. shells from the British Purchasing Commission will require about 20,000 tons of steel. The Chicago inquiry calls for 1,703,000 shells in five sizes—155 mm., 105 mm., 90 mm., 75 mm. and 3 in. An undisclosed quantity of 500 lb. demolition bombs is also included in the inquiries. The Pittsburgh inquiry covers similar sizes of shells.

CHICAGO reports a movement on the part of consumers to inquire into deliveries for the first quarter of next year, prices at time of shipment to prevail.

Bookings at CHICAGO this month are from 15 per cent to 20 per cent ahead of those of August. Bars, plates, and pipe are most active, while tin plate is practically at a standstill. The defense program is increasingly felt and domestic consumption in general is strong. Warehouse activity is increasing.

Because of tight rolling schedules, substantial tonnages of rails probably will be placed in the near future, which will be at least a month ahead of the placements a year ago.

Demand for steel remains consistent and strong at CLEVELAND and YOUNGSTOWN, with aggregate orders for the month up to Sept. 23 running close to the volume of tonnage received in the same part of August. Buying has exceeded expectations in some divisions, such as flat rolled, and apparently is caused by the desire of consumers to maintain stocks which are ample in all respects.

Railroad purchases have picked up sharply at CLEVELAND during the past week. Reports indicate that agricultural implement makers are increasing their production and will be producing heavily in a few more weeks. Large inquiries for munitions work indicate a tight situation in shell steel markets after the shell makers get tooled up and embark upon production some months in the future.

New capacity for production of electric furnace alloy steel is being rushed into service in central Ohio and will help alleviate one of the most serious bottlenecks in the whole steel situation. Both the United States rearmament program and requirements of the British count heavily upon alloy steel. At one Ohio steel plant about one-third of electric furnace ingots will be devoted to armor plate.

Slightly better bookings were reported in NEW YORK in the past week, especially in the heavier steels and special sheets. While a large share of this increase is traceable to defense projects, makers of strictly non-military products are also buying more freely. Concrete mixing equipment makers, radio and refrigerator makers, fabricators, railroad equipment builders, and marine equipment makers were all active buyers in the past week.

A second group of bids for mess ware for the Army has been issued requiring close to 180 tons of stainless. This lot, together with a previous lot already closed, and two recent domestic inquiries brings stainless required for Army mess ware up to about 400 tons.

Rebuilding of the Kenvil, N. J., plant of Hercules Powder Co. is underway and rush orders for galvanized sheets have been placed with several New York warehouses. Nail requirements for Fort Dix cantonments, estimated at 15,000 kegs, have been placed, with 700 kegs of cut nails going to a Reading, Pa., nail producer.

September specifications at BUFFALO are slightly ahead of the totals for the corresponding periods of the last three months.

New orders at most mills in the PHILADELPHIA area are well up to August levels. Interest continues to center mainly in plates, structural material and bars. Sheet buying is not heavy and deliveries have eased somewhat. Additional quantities of bars, bringing the total to 5000 tons, are being figured for the manufacture of shells by the Edward G. Budd Mfg. Co. for the United States government.

Business is booming at BIRMINGHAM for all classifications of steel products except roofing sheets and wire products. Business for the latter falls considerably short of demand for other products. This is attributed largely to unseasonal weather for farmers earlier in the year.

Steel Operations

. . . Rate for industry unchanged at 93 per cent . . . Some gains, some losses

With gains and losses in steel ingot production approximately balancing, the average rate of operations in the industry this week is 93 per cent, unchanged from last week. There was a gain of two points at PITTSBURGH but a loss of two points at CHICAGO and YOUNGSTOWN. Other districts to gain are SOUTHERN OHIO, CLEVELAND and NEW ENGLAND. In a majority of districts there has been no change from last week.

Pig Iron

. . . Trend of buying and shipping is upward in most areas

Pig iron, which has been slower than steel to feel the effects of business improvement, has been showing consistent gains in nearly all districts during the past two weeks.

One explanation for the improved volume of forward buying is that some users, heretofore fearful that an early defeat of Great Britain might upset the market, are now more strongly convinced of the possibility that Britain will hold out.

From CLEVELAND comes the report that the market for the first time is showing "a bullish tinge." New sales are heavier there as domestic consumers seek to round out stocks. Production of agricultural implement foundries is picking up and will be at a peak in four or five weeks. The railroad field is quite active, as are automotive foundries and heating equipment concerns. In the CLEVELAND district most foundries are now working five days a week.

In the CHICAGO district September is showing a gain over August in sales and shipments. From there also it is reported that foundries are building up inventories.

Likewise at ST. LOUIS there has been marked improvement, it being estimated that shipments this month will be about 50 per cent over those of August. The heaviest demand there is for basic iron.

Shipments in the CINCINNATI district are running above previous peaks. New buying there is not as impressive as shipments because many users have orders on the books for their requirements at least to the end of the year.

Merchant iron releases in the South are also heavy. All of the 18 furnaces in the BIRMINGHAM district remain in blast.

A large foundry in the BUFFALO district has increased operations 25 per cent over a month ago. Similar conditions prevail throughout that territory. Consumption of iron is heavy in NEW ENGLAND, although new buying is not active.

Shipments are also heavier in the PHILADELPHA district, some foundries having extended their work week to six days. Also in the NEW YORK area shipments and melting operations continue to expand.

Pittsburgh Crucible Steel is expected to blow in its second blast furnace either this week or next, which will give the Pittsburgh district a total of 41 furnaces in blast out of 50. Most of the nine idle stacks, however, would probably need substantial renovation before they could be brought in. Pittsburgh pig iron makers are sure of shipping not only total capacity production throughout the rest of this year but in some instances will sell a sizable portion of their existing inventories. Radiator and sanitory ware interests are operating at high levels and a steady but important pick up has been noted in small jobbing foundry activity.

Coke

. . . No shortage seen now . . . More beehive ovens in

Furnace coke supplies in the greater Pittsburgh area appear to be fairly well in balance with demand. With beehive production capable of expansion, no shortage is foreseen at the present time. U. S. Steel Corp.'s subsidiary, H. C. Frick Coke Co. has brought in 400 beehive ovens at its Phillips plant in the Connellsville region. Although the coke from this plant, which will approximate 20,000 tons a month, is reported to be for consumption of U. S. Steel subsidiaries, it is more probable that the major part of the output will find its way to a merchant furnace in the Shenango Valley. This particular merchant furnace had been getting its coke from an integrated steel mill in the Pittsburgh district but because the latter is blowing in an additional blast furnace, a new source for coke supplies had to be found.

Wire Products

. . . Demand in good volume at firmer prices

Total wire sales at PITTSBURGH improved some in the past week, the expansion being noted in manufacturers' wire and merchant wire products demand. Wire rod sales continue in heavy volume.

At CLEVELAND the sales situation continues highly satisfactory with neither a bulge nor a drop-off during the past week. Orders, production and shipments of manufacturers' wire are particularly good.

Chicago district outlets find wire prices very firm. Demand is widespread and is bolstered noticeably by orders directly traceable to the defense program.

The Engineers Corps, War Department, Washington, has awarded 12,500 100-lb. rolls of 625 net tons of four-point barbed wire to the Pittsburgh Steel Co., at $44,619.50 and 2000 rolls or 200 tons of similar material to the American Steel & Wire Co., at $8,084. The awards to the Pittsburgh Steel Co. covered three lots, as follows: 8000 rolls, f.o.b. cars, Schenectady, N. Y.; 4000 rolls, f.o.b. cars, Columbus, Ohio, and 500 rolls, f.o.b. cars, Brooklyn. The American Steel & Wire Co. awards covered 1000 rolls, f.o.b. cars, Fort Sam Houston, Tex., and 1000 rolls, f.o.b. cars, Fort Mason, San Francisco.

Iron Ore

. . . August consumption highest since same month in 1929

Consumption of Lake Superior iron ore during August totaled 5,700,743 gross tons, highest of any month since August, 1929, when 5,779,000 tons were used. The latest figure compares with revised consumption of 5,523,595 gross tons in July and 3,775,132 tons in August, 1939.

Cumulative consumption up to Sept. 1 for the year 1940 was 38,557,004 gross tons against 23,889,355 tons to Sept. 1, 1939.

Ore on hand at furnaces and Lake Erie docks Sept. 1 totaled 32,934,665 tons, including tonnages at Eastern plants which are using a small proportion of Lake ore. On Aug. 1 ore on hand totaled 28,244,066 tons and on Sept. 1, 1939, the total was 32,714,372 tons. The Lake Superior Iron Ore Association, Cleveland, which issues this monthly report, recorded 155 stacks using Lake ore in blast Aug. 31 with 34 idle. On July 31 there were 153 such stacks active and on Aug. 31, 1939, only 111 were in blast.

For the first time this year the American Great Lakes ore fleet reached 100 per cent operations upon Sept. 15, according to the report of C. C. Lindeman, statistician of the M. A. Hanna Co., Cleveland.

Semi-Finished Steel

. . . Specifications at high level
. . . Wire rod bookings heavy

Semi-finished steel specifications continue at high levels and would probably be augmented somewhat if additional supplies were available. There are, however, only a few large companies in a position to sell some types of semi-finished steel and several integrated steel mills which at one time sold in the open market are using every bit of available capacity for their own finishing mills. Wire rod bookings have been substantial recently and tube round requirements for shells are increasing steadily. The British are an important factor in this latter item and U. S. government orders are slowly increasing and will reach larger proportions next month.

At Chicago, semi-finished steel continues to be a leader in demand, with broad domestic consumption holding up strongly.

A New York company, which has received a new contract from the British for 12-in. shells, will require about 20,000 tons of steel.

Tubular Goods

. . . Pipe sales other than for oil country are fair

Tubular goods sales at PITTSBURGH on the whole compare favorably with a month ago but oil country goods specifications are not up to the August level. Line pipe, boiler tube, mechanical tubing and standard pipe tonnage account for the improvement in volume recently.

At YOUNGSTOWN Republic Steel Corp. now is operating its second new continuous butt weld pipe mill, designed to manufacture pipe in lengths up to 55 ft. and from 1 in. to 4 in. in diameter. Production speeds from 75 to 300 ft. per min. are permitted. Maximum capacity of the mill will be about 25 tons per hr.

Sheets and Strip

. . . Orders have shown definite improvement in past 10 days

Although not enjoying the same avalanche of specifications that is existent in most other markets, sheet orders at PITTSBURGH in the past 10 days show a definite improvement in volume over the previous 10 days. Some of this business for prompt delivery has emanated from automotive centers with moderate sized orders being booked at the present published price. Expansion in demand, however, has come from fields other than automotive and recently involves chiefly hot rolled material. Deliveries are still running from four to five weeks on hot rolled sheets. Cold rolled sheet demand is somewhat behind hot rolled but improvement has even materialized there. Hot rolled strip orders at PITTSBURGH are showing more strength than sheet business.

At CLEVELAND new orders are surprisingly good, the result of the trade's efforts to maintain substantial inventories. Production continues at a high rate but limited by occasional shortages of slabs. A feature at CLEVELAND this fall is

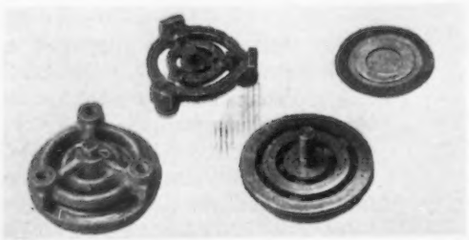
Forgings PROVIDE AN EXTRA MARGIN OF SAFETY

FOR VALVE BODIES AND VALVE OPERATING PARTS

Freedom from defects in an unusual degree makes forgings particularly suitable for units that operate under high pressures and unusually severe conditions. In forgings, uniformity of physical properties is obtainable, after heat treatment, in the exact degree desired. This uniformity, combined with strength and freedom from concealed defects, underlies the fact that forgings contribute a greater margin of safety.

Forged brass valve bodies and cylinders of Square D Capacity Booster Valves, used in refrigerating and air-conditioning systems, not only have a wide margin of reserve strength, but "are free from hidden defects such as blow holes, spongy, or porous metal". Obviously, there is practically no danger of leakage.

The remarkable durability of Simplate Valves is said to be due to their straight lift without bending, twisting, or sliding; and to the use of light weight valve discs of stainless steel heat treated, tempered, and ground, operating between forged valve seat and valve keeper. According to the manufacturer the use of forged valve parts endows the operating mechanism with "maximum strength" and "assures the elimination of defective parts".



"Drop Forging Topics" gives actual information about the application of forgings in the manufacture of a wide range of equipment. It is published particularly for engineers and designers, metallurgists, production and management executives. If you are not already receiving it, write today. It's free.

THERE ARE NO SUBSTITUTES FOR FORGINGS

DROP FORGING ASSOCIATION
605 HANNA BUILDING • CLEVELAND, OHIO

the wider sheet widths being supplied certain automobile makers. Whereas 76 in. wide was the maximum desired a few years ago, today automotive sheets 87 in. wide are being shipped in large quantities to Michigan. This development may forecast widespread modernization of continuous strip mill facilities.

Sheet specifications at Chicago show no marked improvement. A very slight tapering off in agricultural implement activity tempers that market. Though automotive production is moving up, Detroit is using steel on hand or on order for the present. However, warehouse business is very much alive, increasing each week.

The Division of Purchases, Sales and Traffic, Department of Agriculture, opened bids on Tuesday of the present week for 8277 additional steel grain bins. Each bin will require approximately 1¼ tons of sheets. Awards for 16,000 tons of sheets have been made for 13,701 bins which the department recently contracted for. It is reported that the Carnegie-Illinois Steel Corp. was awarded about 11,200 tons and that the remaining tonnage was distributed among the Bethlehem Steel Co., the Republic Steel Corp. and the American Rolling Mill Co.

Reinforcing Steel

. . . More than 50,000 tons pending . . . Awards 6520 tons

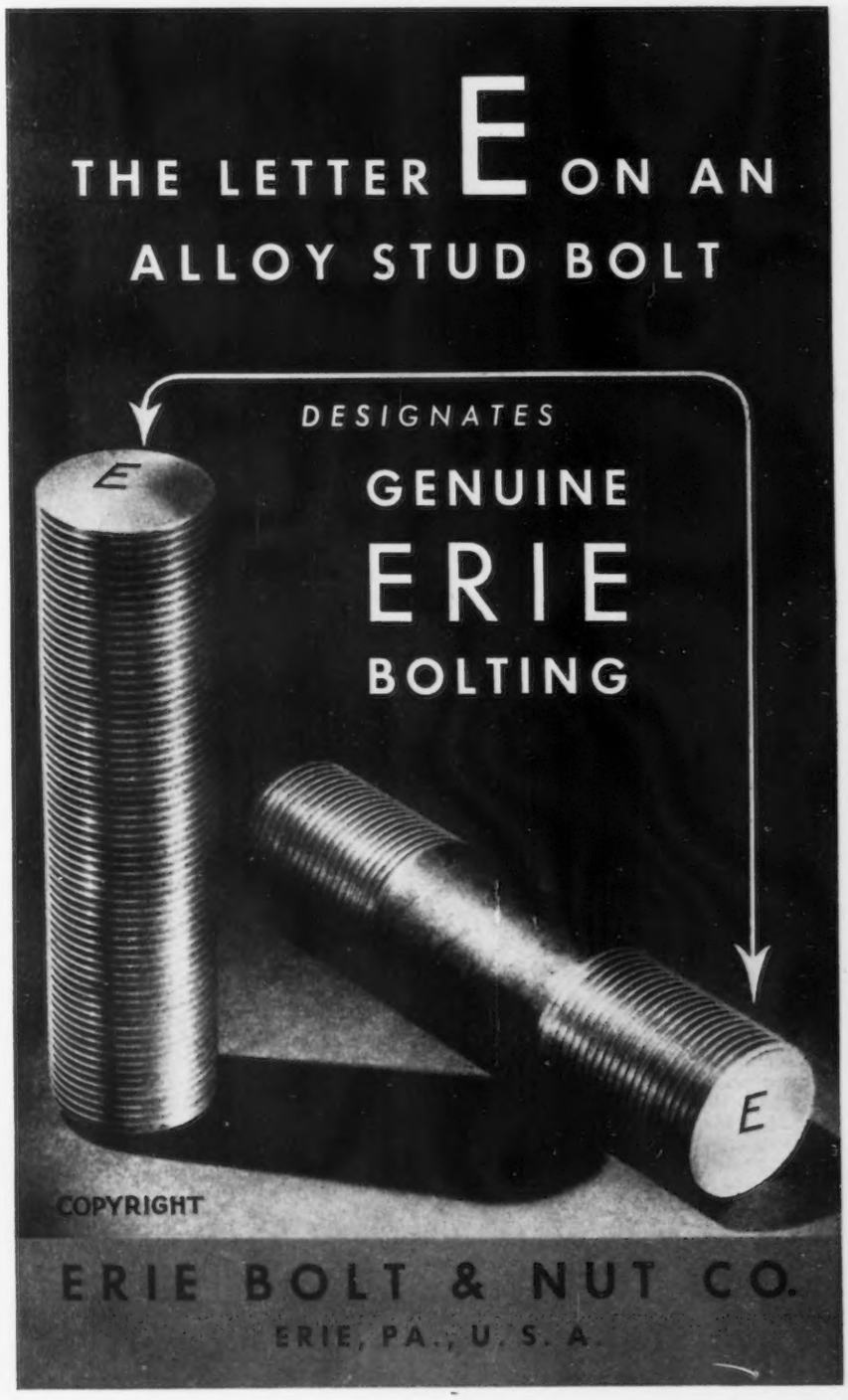
Possibly more than 50,000 tons of concrete bar business is pending and will undoubtedly be placed in the near future. Relatively speaking, prices are exceptionally firm, with a few isolated soft spots and there is a tendency for these to firm up. The recent change in trucking charges, which were revised to 10c a 100 lb. at basing points and the NEW YORK district, may soon be extended to the NEW ENGLAND district, where the charge is now 5c. Increased costs have brought about the agitation for the revision.

Reinforcing steel awards of 6520 tons include no letting of more than 750 tons. New reinforcing steel projects call for 6350 tons, including 1340 tons for buildings at Hawthorne, Nev., for the Naval ammunition depot, and 1200 tons for a post office garage at Boston.

Merchant Bars

. . . About 100,000 tons of shell steel pending at Chicago

Approximating 100,000 tons of shell steel, most of which will go to CHICAGO district producers, one of the largest shell orders to date, is expected to be formally awarded very soon. A quantity of 403,000 shells of the 155 mm. size, 400,000 of the 105 mm. size, 300,000 of the 90 mm. size, 400,000 of the 75 mm. size and 200,000 of the 3-in. AA, plus an undisclosed quantity of 500 lb. demolition bombs, form the inquiries on which low bidders have already been determined. Six low-bidding companies are involved. Hot rolled carbon bars and alloy bars continue to reign at the top



with CHICAGO mills. Deliveries are extending as backlogs build up.

Large inquiries for munitions work continue to be the feature of the bar market at CLEVELAND. After around seven months set-up time, munitions makers will require heavy monthly tonnages. Operations of most non-military manufacturing plants are gaining. The agricultural implement industry is adding extra shifts and will be in full blast by approximately Nov. 1.

The rush to get on order books for hot rolled bars at PITTSBURGH continues unabated and the volume of specifications so far this month is as much if not greater than during the same period last month. Demand is well diversified, automotive concerns becoming more of a factor. Deliveries on most sizes range from six to eight weeks. Demand for alloy hot rolled bars is heavy.

CAPACITY DOUBLED by DRAVO

Does the work formerly requiring two bridges

● The Pittsburgh Coal Company operated two 6-ton coal bridges at their Superior, Wis., docks. One bridge alone was incapable of handling the total traffic, yet the operating costs of the two bridges constituted too great an overhead. Dravo designed a man trolley of aluminum, greatly increased the speed of travel without over-stressing the structure, and raised the capacity of one bridge to 12 tons. By eliminating the use of the second bridge, operating costs were reduced proportionately.

● Whether the problem is one of modernizing old equipment, replacing obsolete handling machines or designing special facilities to meet new problems, consultation with Dravo Corporation may prove to be of great value to you. Added to its ability to fabricate and erect, design and put into commission ideas as shown above, Dravo Corporation has had years of experience building docks, retaining walls, plant foundations—everything that enters into the problem of terminal facilities. Bulletin 403 describes mill foundations and terminal equipment. Bulletin 202 describes revolving cranes. Either will be sent on request. Inquiries relative to specific problems may be addressed to

DRAVO CORPORATION

ENGINEERING WORKS DIVISION

SHIPYARDS: PITTSBURGH, PA.—WILMINGTON, DEL.
GENERAL OFFICES AND SHOPS: NEVILLE ISLAND—PITTSBURGH, PA.

Railroad Buying

. . . 5640 freight cars and 10 locomotives ordered

Freight car awards in the past week were 6640 cars, the heaviest weekly volume since the car buying movement of last fall. Close to 7700 freight cars have been placed thus far this month, the highest for any full month since October, 1939, and comparing with 7600 cars awarded in the full month of August.

The week's rolling stock purchases include 3000 for Southern Pacific, allocated as follows: 1500 box cars to Pullman Standard Car Mfg Co., 750 hopper cars to Pressed Steel Car Co., 250 low side gondolas to Mt. Vernon Car Co., and 500 high side gondolas to American Car & Foundry Co. Union Pacific has ordered 1000 ballast cars from American Car & Foundry Co.

Norfolk & Western has placed 1000 gondolas, awarding 500 to Virginia Bridge Co., and 500 to Ralston Steel Car Co. Pittsburgh & Lake Erie has ordered 1000 cars from Dispatch, Inc., and Pere Marquette has allocated 600 box cars as follows: 200 to American Car & Foundry Co., 150 to General American Transportation Corp., 150 to Pullman Standard Car Mfg. Co. and 100 to Greenville Steel Car Co. Pere Marquette also contemplates purchasing shortly an additional 200 gondolas. Duluth, Mesabi & Iron Range has ordered 30 ballast and 10 covered hopper cars from American Car & Foundry Co.

Chesapeake & Ohio has ordered 10 type 2-6-6-6 articulated freight locomotives from Lima Locomotive Co. Value of this order is placed at $2,250,000. In addition to three locomotives purchased from Baldwin Locomotive Works by Boston & Maine, reported in THE IRON AGE, Sept. 12, this road has an option of two more engines of the same type.

Baltimore & Ohio is contemplating the purchase of seven 2000-hp. locomotives for passenger service. Navy Department is taking bids on 40 freight cars for Norfolk, Va., navy yard.

Rail purchases reported in the past week were rather light, but several large programs are pending, including 65,000 tons for New York Central (bids closing Sept. 30) and an estimated 60,000 tons for Southern Pacific.

Structural Steel

. . . Awards total 42,030 tons . . . many defense jobs

Fabricated structural steel awards advanced to 42,030 tons from 25,500 tons last week. The largest lettings are 7000 tons for the Chrysler Corp. tank plant at Centerline, Mich.; 6700 tons for the Hartford-East Hartford, Conn., bridge; 6210 tons for an ordnance plant at Charlestown, Ind., for E. I. du Pont de Nemours & Co.; 2600 tons for the Grumman Aircraft Engineering Co. at Bethpage, L. I.; 1550 tons for machine shop extensions at Homestead, Pa., for the Mesta Machine Co.; 1450 tons for two Navy land hangars at San Diego, Cal.; 1390 tons for barracks at Quonset Point, R. I., for the Navy Department; 1100 tons for warehouse extensions at Mansfield, Ohio, for the Westinghouse Electric & Mfg. Co., and 1050 tons at Depue, Ill., for a furnace building for the New Jersey Zinc Co.

New structural steel projects declined to about 13,000 tons from 50,700 tons a week ago.

Plates

. . . Deliveries extended except from some Eastern mills

Average plate deliveries at PITTSBURGH are being quoted at from six to eight weeks, with some wide sections even more extended.

At CLEVELAND production has been good on wide continuous mill plates for the British and for American shipbuilders and domestic railroads.

At Chicago plates continue to be one of the three most active products with all producers. Aside from defense business, construction demand is also heavy. Backlogs are building up on plates in this district with deliveries ranging from one week to 10 days on 30 in. to 84 in. sheared plates up to four to six weeks on 84 in. to 150 in. sizes.

Both domestic and export bookings in NEW YORK showed a slight gain in the past week, accompanied by a further lengthening of delivery dates. The week's export business, mostly to South Africa, was at the current export level, but one eastern Pennsylvania producer has raised its export price to a full 2.15c., f.a.s. Philadelphia, commission included.

Tin Plate

. . . Operations at 41% with no gain expected before first quarter

Tin plate operations continue unchanged this week at 41 per cent of capacity. There is evidence that the rate may go lower over the remainder of the year and that no important upturn will come before the first quarter.

Reasons for the pronounced slump in tin plate production are several. Can manufacturers have heavier inventories of manufactured cans and tin plate than they had at this time last year; shipments of cans have fallen off because of delayed crops, particularly tomatoes, which normally constitute one of the heaviest food packs; and, export business has been light for some time.

The more you use a hoist the more money you save. But the harder and longer the use, the more apt you are to require some servicing. The Lo-Hed Hoist is built to bear hard use and abuse with little servicing. Yet if it should ever need an adjustment or replacement you can make it easily. A screw driver removes both hoist covers, exposing motor, holding brake and drum. A wrench lets you get at gears, bearings, shafts and lowering brake. The easy-to-service advantage of the Lo-Hed Hoist is only one of its many thoroughly time-tested features.

Look-over the open-view of the Lo-Hed Hoist pictured here. Note carefully these other worthwhile, time-tested points: Heavy duty hoist type motor, automatic lowering brake, anti-friction bearings, stub tooth spur gears, plow-steel cable, 100% positive automatic upper limit stop, dust and moisture-proof controller. (Construction varies slightly for classes of Lo-Heds.)

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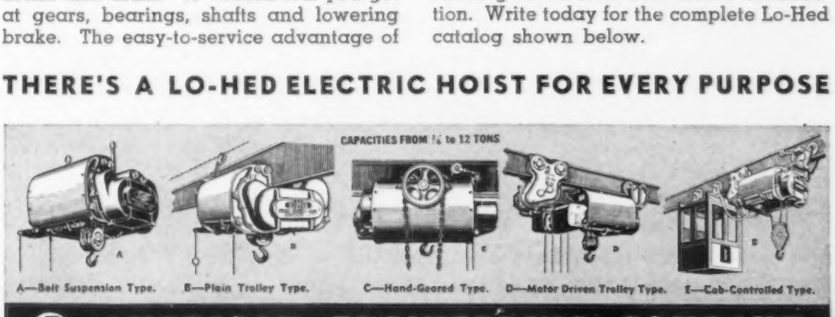

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Machine Tools

. . . SALES, INQUIRIES AND MARKET NEWS

Tremendous Demand in East

New York

• • • **Fully 90 to 100 per cent** of present sales in this district are directly or indirectly related to the defense program. Several large ordnance and munitions contracts have been placed in this area in recent weeks and the contractors involved are all heavily in the market. Some expect to be in production by Jan. 1 and are having difficulty in getting any machinery seller to promise deliveries before that date. Turret lathe makers are generally quoting May to July, 1941, deliveries, and have declined to bid on such work. Aircraft engine and parts makers continued to dominate the market, however, and some extremely large unit orders have been placed. Arsenal and Navy yard buying also continues to be an important factor. As a result, the September volume will exceed that of August by a large percentage, despite the record-breaking proportions of that month. Some dealers have done several millions of dollars worth of business in a single month.

Warehouses here are bulging with machinery for which no export licenses can be obtained from the State Department. It is understood that lists of such machine tools are being offered as a source of supply to defense contractors, pending the passage of the Fadis bill enabling the President to commandeer such machinery in the interests of national defense. Prices are above domestic delivered prices. Machine tools for Great Britain and the Dominions are not affected as licenses are being obtained for these exports.

Used equipment is in demand and the chief problem of sellers of such machinery is to obtain recent models for resale. The scarcity of machines five to 10 years old is due to the small sales during the lean years in the early "Thirties."

September a Record Month

Cincinnati

• • • **September machinery sales** in the southern Ohio district are reported to be the heaviest of the current year. Order books of district machine tool plants continue to bulge, while the immediate prospects continue to be definitely bright as inquiries flow into offices. Manufacturers generally indicate there is still a substantial amount of business unplaced and as one manufacturer put it, September is the best month of the year, with still a lot in sight.

Defense Contractors Buying

Cleveland

• • • **A very heavy volume** of orders and inquiries for machine tools is coming from manufacturers who have been awarded contracts to supply equipment for the national defense program and delivery dates on some lines are being extended rather rapidly. New orders for turret lathes range up to 100 or more machines and one leading manufacturer is now booked up until next July and August on some sizes. Demand for machinery is expected to continue at the present high rate for from four to six weeks or until government contractors get their tool requirements lined up.

General Buying Predominates

Chicago

• • • **Machine tool bookings** to date in September are already ahead of the entire month of August as regards unit volume, but the month as a whole may not equal August's dollar total, which was quite high.

For TOOLS and DIES of INTRICATE DESIGN

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Non-Shrinkable Alloy Steel

JESSOP "TRUFORM" is an oil-hardening tool steel which, because of its low coefficient of expansion possesses exceptional non-deforming properties. Its use is essential where extreme accuracy of tools and dies must be maintained.

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CARBON- HIGH SPEED- SPECIAL ALLOY
STAINLESS and COMPOSITE STEELS

Non-Ferrous Metals

. . . MARKET ACTIVITIES AND PRICE TRENDS

New York, Sept. 24—Growing appreciation of the magnitude of the requirements of the defense program, together with the fast growing realization that the war will probably not be a short war, culminated in the past week in a new bullishness which permeated all the major non-ferrous markets. The early part of the week was comparatively quiet, but buying quickened as the week closed, with demand generally far in excess of available supplies. The first two days of the present week found demand undiminished with both producers and custom smelters reluctant to accommodate all demands put before them.

Quotations on electrolytic metal were advanced today by both producers and smelters to 12c per lb., delivered Connecticut Valley. Some custom smelters and small producers have temporarily withdrawn from the market. Export sales were in moderate volume all the past week, with prices showing a firmer tendency toward the close of the period. Lead, zinc and tin markets also participated in the buying movement and higher quotations were put into effect in those markets on Monday.

Zinc

Under constant buying pressure which showed no signs of lessening during the past week, the market finally yielded and rose $8 a ton yesterday. Prime Western is now quoted at 7.64c. per lb., New York. Supplementing strong domestic demand, a factor in the rise was increased demand from abroad at prices corresponding to the new level. Recognition of the large requirements for zinc for the national defense program has been the chief reason for insistent buying efforts in the domestic market. Sales of prime Western for the past week were 5229 tons, compared with 19,338 tons in the previous week. Shipments of 6328 tons compare with 6484 tons two weeks ago.

Lead

Culminating a heavy demand throughout the past week, the market advanced $2 per ton yesterday to 5.00c. per lb., New York. Sellers have been reluctant to increase prices in spite of improved buying but the heavy consumer pressure for metal in the past week forced the issue. Business transacted during the week was in good volume, all sales quotas being well filled with orders left over. September requirements are almost completely filled now and an increasing preference for October metal is seen. The latter month is now better than 50 per cent bought.

Tin

The market showed definite signs of reviving during the past week, probably due to the better sentiment in other markets. Buyers' interest improved gradually toward the end of the period, at which time transactions were in good volume at 50.05c. per lb. for prompt Straits, New York. Prices were unchanged throughout the past week, but advanced today to 50.25c. per lb. Many consumers are now reported as well covered for many months in advance. Rumors of a possible large purchase by Great Britain for the purpose of increasing her reserves remains unconfirmed.

Better Spring Performance demands

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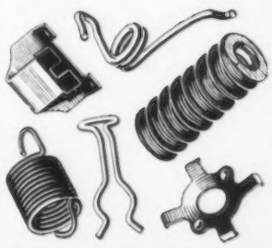

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Scrap . . . MARKET ACTIVITIES AND QUOTATION TRENDS

• • • A further rise in THE IRON AGE scrap composite is recorded this week, bringing the composite up to $20.29 from $20.13 a week ago. The increase was due to an advance of 25c. in the averages at both Chicago and Pittsburgh with Philadelphia unchanged. Outside of Birmingham and Cincinnati, where rather general increases occurred, prices in most districts, while still strongly supported, evidence a continuation of the sidewise movement of a week ago. Heavier operations at rail rerolling plants, occasioned by the increased demand for concrete reinforcing bars for government construction projects, has given rise to a run on rerolling rails and sharp increases in quotations on this item are reported in most districts this week. Developments in Indo-China are likely to find reflection in the attitude of U. S. officials toward issuance of export licenses for Japanese shipments. Most brokers anticipate an eventual total embargo on such shipments and are adjusting their activities with such a possibility in mind.

Pittsburgh

The market undertone continues exceptionally strong. No. 1 steel is quoted at a $1 spread of $20 to $21 a ton, up 25c. from last week. Sales into consumption have been made within this range, which also represents prices being paid by brokers. Secondary grades also continue strong. Probably the only factor holding prices down is the disinterest of several buyers.

Chicago

On the basis of broker-dealer transactions, heavy melting steel rose 50c. this week to $19.50 to $20. Unconfirmed reports have a mill paying $20.50. Rerolling rails are up $1.25 to a top of $24.50. Some important buyers have not entered the market for more than two weeks, indicating an undertone of watchful waiting.

Philadelphia

For the first time in several weeks prices on major steel items are unchanged. Scrap is flowing steadily into consumption and mills appear willing to take all that can be shipped. Steel rails for rolling are higher, recent sales having been made within a range of $25.50 to $26. Some export business has been transacted within the week on the basis of $19.50 for No. 1 and $18.50 for No. 2.

Youngstown

The market continues in a strong position and dealers are offering high prices to cover, in some cases as much as $1 over present published quotations. One steel producer, however, has shut off shipments entirely at Youngstown, while at Warren there were no restrictions at the start of this week.

Cleveland

Outside of a 50c. upward revision in blast furnace quotations, prices are unchanged here at the start of this week. There are signs of a possible further rise in No. 1 heavy melting, but actual mill transactions have not been consummated. Dealers are paying high prices to cover old orders. A few hundred tons of railroad steel commanded around $21 for mill usage, it is reported.

Buffalo

No new sales have been made by brokers within the last week, but the market shows increasing strength. No. 1 heavy melting could be quoted at $20 to $21, several brokers contend, but no substantial sales have been made to justify such an increase in published prices. Machinery and cupola cast is quoted 50c. higher this week.

Birmingham

With an advance of $1.50 on No. 1 and No. 2 heavy melting prices here are equal to the peak prices of 1939 for this district. Supplies remain limited with heavy demand being made by steel mills and foundries.

Cincinnati

Further strength in the scrap market here is reflected in an increase of 50c. in dealers' bids on all items. Mills are accepting material without too great pressure on quotations, while foundry demand tends to broaden. In addition to the current sales activity in the market, dealers generally report a substantial number of inquiries for material.

Detroit

Continued increase in dealers' buying prices in the Detroit area accompanied recent bids on auto body bundles which apparently went to the $19 level, possibly higher. Bundles bought on a large recent list are reported to be laid down on the docks in anticipation of shipment this fall. Resumption of heavy production in automotive foundries has created a demand for foundry items, although heavy breakable cast, principally automotive dies, is not in great demand and prices, if anything, are lower on this grade.

St. Louis

The principal sale during the week was 4000 to 5000 tons of No. 2 melting steel at 50c. over the preceding week's sale. A round tonnage of specialties was also sold at prices from 50c. to $1 higher. Country yards are holding on to their stocks, which are said to be not large, for higher prices.

New York

Heavy domestic shipments continue, with new interest being shown in foundry items. Outside of an increase in rerolling rails, domestic buying prices are unchanged. New York City recently sold 1000 tons of rails at $19.76, on the ground, and a large railroad has sold rails recently at around $25.50, delivered along its line. Buying prices for No. 2 steel for export have been advanced 50c., but other export prices are unchanged. Japanese interests placed some small tonnages last week, mostly with West Coast dealers.

Boston

More activity for domestic and export account is reported with average prices a shade firmer. However, strength of No. 1 steel at markets outside New England so far has not been reflected to any appreciable extent locally. Boats now leave here regularly for Canadian and English destinations, and a boat is scheduled to load at Providence this week, presumably for Japan. New England consumers, including American Steel & Wire Co. and Washburn Wire Co., are reported to have bought little scrap in the past week. On the other hand, shipments to the Pittsburgh district and to eastern Pennsylvania have been stepped up and include stove plate and No. 2 cast for barge shipment from Providence.

Toronto

Trading continues at a brisk rate, with melters extending efforts to obtain large tonnages for spot and future delivery. Shipments to Hamilton district are gaining in volume. Dealers report fair deliveries into yards from the rural districts with heavy shipments now coming from northern Ontario. Automobile wreckers have reduced offerings and there has been general tightening up of offerings in the Toronto area. Imports from the United States continue at a high rate.

IRON AND STEEL SCRAP PRICES

PITTSBURGH

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel	$20.00 to $21.00
Railroad heavy mltng..	22.00 to 22.50
No. 2 heavy melting..	18.50 to 19.50
Railroad scrap rails...	22.50 to 23.00
Rails 3 ft. and under..	25.50 to 26.00
Comp. sheet steel.....	20.00 to 21.00
Hand bundled sheets..	19.00 to 20.00
Heavy steel axle turn.	19.50 to 20.00
Heavy steel forge turn	18.50 to 19.00
Machine shop turnings	15.50 to 16.00
Short shov. turnings..	17.00 to 17.50
Mixed bor. & turn.....	14.00 to 14.75
Cast iron borings.....	14.00 to 14.75
Cast iron carwheels...	21.00 to 21.50
Heavy breakable cast.	17.00 to 17.50
No. 1 cupola cast.....	20.00 to 20.50
RR. knuckles & coup..	26.50 to 27.00
Rail coil springs.....	26.50 to 27.00
Rail leaf springs.....	26.50 to 27.00
Rolled steel wheels....	26.50 to 27.00
Low phos. billet crops.	26.50 to 27.00
Low phos. punchings..	26.00 to 27.00
Low phos. heavy plate.	24.50 to 25.50
Railroad malleable ...	24.00 to 24.50

PHILADELPHIA

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel	$20.50 to $20.75
No. 2 hvy. mltng. steel.	19.50 to 19.75
Hydraulic bund., new.	20.50 to 20.75
Hydraulic bund., old...	17.50 to 18.00
Steel rails for rolling..	25.00 to 26.00
Cast iron carwheels...	22.50 to 23.00
Hvy. breakable cast...	.... 21.00
No. 1 cupola cast.....	22.00 to 22.50
Mixed yard (f'd'y) cast	19.00 to 19.50
Stove plate (steel wks.)	17.50 to 18.00
Railroad malleable .... 22.50 to 23.00	
Machine shop turn....	14.50 to 15.00
No. 1 blast furnace...	13.00 to 13.50
Cast borings	13.00 to 13.50
Heavy axle turnings..	19.00 to 19.50
No. 1 low phos. hvy...	25.00 to 25.50
Couplers & knuckles..	25.00 to 25.50
Rolled steel wheels....	25.00 to 25.50
Steel axles	23.50 to 24.00
Shafting	25.00 to 25.50
Spec. iron & steel pipe	18.00 to 18.50
Cast borings (chem.).. 14.00 to 14.50	

CHICAGO

Delivered to Chicago district consumers:

	Per Gross Ton
Hvy mltng. steel.....	$19.50 to $20.00
Auto. hvy. mltng. steel alloy free	18.50 to 19.00
No. 2 auto steel.....	15.75 to 16.25
Shoveling steel.....	19.50 to 20.00
Factory bundles	19.50 to 20.00
Dealers' bundles	17.75 to 18.25
No. 1 busheling	18.50 to 19.00
No. 2 busheling, old...	11.50 to 12.00
Rolled carwheels	23.25 to 23.75
Railroad tires, cut .... 23.00 to 23.50	
Railroad leaf springs..	22.75 to 23.25
Steel coup. & knuckles.	23.00 to 23.50
Axle turnings	18.75 to 19.25
Coil springs	23.50 to 24.00
Axle turn. (elec.).....	19.75 to 20.00
Low phos. punchings..	22.50 to 23.00
Low phos. plates 12 in. and under	22.50 to 23.00
Cast iron borings	13.25 to 13.75
Short shov. turn.	14.00 to 14.50
Machine shop turn....	13.00 to 13.50
Rerolling rails	24.00 to 24.50
Steel rails under 3 ft..	23.00 to 23.50
Steel rails under 2 ft..	23.50 to 24.00
Angle bars steel	22.00 to 22.50
Cast iron carwheels ...	20.00 to 20.50
Railroad malleable	23.00 to 23.50
Agric. malleable	17.25 to 17.75
	Per Net Ton
Iron car axles	24.50 to 25.00
Steel car axles ..... 23.00 to 23.50	
Locomotive tires	18.00 to 18.50
Pipes and flues	13.50 to 14.00
No. 1 machinery cast..	17.50 to 18.00
Clean auto. blocks	18.00 to 18.50
No. 1 railroad cast..... 16.50 to 17.00	
No. 1 agric. cast.....	16.00 to 16.50
Stove plate	12.50 to 13.00
Grate bars	14.00 to 14.50
Brake shoes	14.50 to 15.00

YOUNGSTOWN

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel.	$20.00 to $20.50
No. 2 hvy. mltng. steel. 19.00 to 19.50	
Low phos. plate ..... 23.00 to 23.50	
No. 1 busheling ..... 19.25 to 19.75	
Hydraulic bundles .... 19.50 to 20.00	
Machine shop turn.... 14.00 to 14.50	

CLEVELAND

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel.	$19.50 to $20.00
No. 2 hvy. mltng. steel.	18.50 to 19.00
Comb. sheet steel.....	$19.00 to $19.50
Light bund. stampings	15.50 to 16.00
Drop forge flashings...	18.50 to 19.00
Machine shop turn....	12.50 to 13.00
Short shov. turn.....	13.00 to 13.50
No. 1 busheling	18.75 to 19.25
Steel axle turnings....	18.00 to 18.50
Low phos. billet and bloom crops	24.00 to 24.50
Cast iron borings	13.50 to 14.00
Mixed bor. & turn.....	13.50 to 14.00
No. 2 busheling	13.50 to 14.00
No. 1 cupola cast.....	22.00 to 22.50
Railroad grate bars...	15.00 to 15.50
Stove plate	15.00 to 15.50
Rails under 3 ft.	25.00 to 25.50
Rails for rolling	24.00 to 24.50
Railroad malleable	23.00 to 23.50

BUFFALO

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel.	$19.50 to $20.00
No. 2 hvy. mltng. steel	17.50 to 18.00
Scrap rails	21.50 to 22.00
New hvy. b'ndled sheets	17.50 to 18.00
Old hydraul. bundles..	16.00 to 16.50
Drop forge flashings...	17.50 to 18.00
No. 1 busheling	17.50 to 18.00
Machine shop turn.....	13.00 to 13.50
Shov. turnings	14.50 to 15.00
Mixed bor. & turn.....	13.00 to 13.50
Cast iron borings.....	13.00 to 13.50
Knuckles & couplers..	24.00 to 24.50
Coil & leaf springs....	24.00 to 24.50
Rolled steel wheels....	24.00 to 24.50
No. 1 machinery cast.	20.00 to 20.50
No. 1 cupola cast.....	18.50 to 19.00
Stove plate	16.00 to 16.50
Steel rails under 3 ft... 24.50 to 25.00	
Cast iron carwheels... 18.00 to 19.00	
Railroad malleable .... 22.00 to 23.00	

ST. LOUIS

Dealers' buying prices per gross ton delivered to consumer:

Selected hvy. melting.	$17.50 to $18.00
No. 1 hvy. melting....	16.50 to 17.00
No. 2 hvy. melting.....	16.00 to 16.75
No. 1 locomotive tires.	18.50 to 19.00
Misc. stand. sec. rails.	20.00 to 20.75
Railroad springs	21.00 to 22.00
Bundled sheets	12.00 to 12.50
Cast bor. & turn.....	10.00 to 10.50
Machine shop turn....	10.00 to 10.50
Heavy turnings	13.50 to 14.00
Rails for rerolling.....	22.00 to 23.00
Steel car axles	23.00 to 23.50
No. 1 RR wrought	13.50 to 14.00
No. 2 RR wrought.....	16.50 to 17.00
Steel rails under 3 ft...	22.75 to 23.75
Steel angle bars	19.50 to 20.00
Cast iron carwheels...	19.25 to 19.75
No. 1 machinery cast..	19.00 to 19.50
Railroad malleable ...	20.00 to 20.50
Breakable cast	16.75 to 17.25
Stove plate	13.50 to 14.00
Grate bars	14.00 to 14.50
Brake shoes	14.50 to 15.00

CINCINNATI

Dealers' buying prices per gross ton at yards:

No. 1 hvy. mltng. steel.	$16.25 to $16.75
No. 2 hvy. mltng. steel.	14.75 to 15.25
Scrap rails for mltng...	21.75 to 22.25
Loose sheet clippings..	11.75 to 12.25
Hyd'lic bundled sheets	15.50 to 16.00
Cast iron borings.....	7.75 to 8.25
Machine shop turn....	8.75 to 9.25
No. 1 busheling	12.25 to 12.75
No. 2 busheling	6.50 to 7.00
Rails for rolling	23.25 to 23.75
No. 1 locomotive tires.	18.50 to 19.00
Short rails	23.75 to 24.25
Cast iron carwheels...	17.75 to 18.25
No. 1 machinery cast..	20.25 to 20.75
No. 1 railroad cast....	18.75 to 19.25
Burnt cast	12.25 to 12.75
Stove plate	12.25 to 12.75
Agricul. malleable	16.75 to 17.25
Railroad malleable	19.75 to 20.25
Mixed hvy. cast.....	17.50 to 18.00

BIRMINGHAM

Per gross ton delivered to consumer:

No. 1 hvy. melting steel	$18.00
No. 2 hvy. melting steel	17.00
No. 1 busheling	16.00
Scrap steel rails	17.00
Steel rails under 3 ft...	19.50
Rails for rolling	20.00
Long turnings	7.50
Cast iron borings	8.50
Stove plate 11.00	
Steel axles	18.00
No. 1 RR wrought.....	16.00
No. 1 cast	17.00
No. 2 cast	13.00
Cast iron carwheels....	17.00
Steel carwheels	18.00

DETROIT

Dealers' buying prices per gross ton, f.o.b. cars:

No. 1 heavy melting..	$16.00 to $16.50
No. 2 heavy melting..	15.00 to 15.50
Borings and turnings..	11.50 to 12.00
Long turnings	10.25 to 10.75
Short shov. turnings..	11.50 to 12.00
No. 1 cast	18.50 to 19.00
Automotive cast	18.50 to 19.00
Hvy. breakable cast...	15.00 to 15.50
Stove plate	12.25 to 12.75
Hydraul. Comp. sheets	18.00 to 18.50
New busheling	16.25 to 16.75
Sheet clips	14.50 to 15.00
Flashings	15.50 to 16.00
Low phos. plate	19.00 to 19.50

NEW YORK

Dealers' buying prices per gross ton on cars:

No. 1 hvy. mltng. steel.	$16.00 to $16.50
No. 2 hvy. mltng. steel.	15.00 to 15.50
Hvy. breakable cast...	17.00 to 17.50
No. 1 machinery cast.	18.00 to 18.50
No. 2 cast	15.50 to 16.00
Stove plate	13.00 to 13.50
Steel car axles	20.00 to 21.00
Shafting ..... 20.00 to 20.50	
No. 1 RR. wrought.... 14.50 to 15.50	
No. 1 wrought long.... 13.00 to 13.50	
Spec. iron & steel pipe 12.00 to 12.50	
Rails for rolling	19.00 to 19.50
Clean steel turnings*..	10.00 to 10.50
Cast borings* ..... 8.50 to 9.00	
No. 1 blast furnace.... 8.50 to 9.00	
Cast borings (chem.).. 10.00 to 11.00	
Unprepared yard scrap	8.50 to 9.00
Light iron	6.50 to 7.00

Per gross ton delivered local foundries:

No. 1 machin. cast.....	$19.00
No. 2 cast	$16.00 to 16.50

* $1.50 less for truck loads.

BOSTON

Dealers' buying prices per gross ton:

Breakable cast	$15.25 to $15.50
Machine shop turn....	9.00 to 9.25
Mixed bor. & turn.....	7.25 to 7.50
Bun. skeleton long....	12.50 to 12.75
Shafting	19.25 to 19.50
Stove plate	12.25 to 12.50
Cast bor. chemical.....	9.50 to 9.75

Per gross ton delivered consumers' yards:

Textile cast	$17.00 to $21.60
No. 1 machine cast....	17.00 to 20.00

Per gross ton delivered dealers' yards:

No. 1 hvy. mltng. steel.	$15.00 to $15.50
No. 2 steel	14.00 to 14.25

PACIFIC COAST

Per net ton delivered to consumer:

	San Fran.	Los Ang.	Seattle
No. 1 hvy. mltng. steel	$13.50	to	$14.00
No. 2 hvy. mltng. steel	$13.00		
Bundles	12.00		

CANADA

Dealers' buying prices at these yards, per gross ton:

	Toronto	Montreal
Low phos. steel.....	$12.00	$11.50
No. 1 hvy. mltng. steel.	**11.25**	**10.75**
No. 2 hvy. mltng. steel.	9.75	9.25
Mixed dealers steel...	**8.75**	**8.25**
Drop forge flashings...	**9.75**	**9.25**
New loose clippings...	**8.75**	**8.25**
Busheling 6.00		**5.50**
Scrap pipe 7.75		**7.25**
Steel turnings 7.25		**6.75**
Cast borings 6.75		**6.25**
Machinery cast 20.00		**19.00**
Dealers' cast 19.00		**18.00**
Stove plate	15.00	14.50

EXPORT

Dealers' buying prices per gross ton:

New York, truck lots, delivered, barges

No. 1 hvy. mltng. steel.	$16.50 to $17.00
No. 2 hvy. mltng. steel.	15.50 to 16.00
No. 2 cast	15.00 to 15.50
Stove plate	12.50 to 13.00

Boston on cars at Army Base or Mystic Wharf

No. 1 hvy. mltng. steel.	$16.50 to $16.75
No. 2 hvy. mltng. steel.	15.50
Rail (scrap)	16.75

Philadelphia, delivered alongside boats, Port Richmond

No. 1 hvy. mltng. steel.....	Nominal
No. 2 hvy. mltng. steel.....	Nominal

Construction Steel

. . .STRUCTURAL STEEL, REINFORCING BARS, PLATES, PILING, ETC.

Fabricated Steel

Lettings advance to 42,030 tons from 25,500 tons last week; new projects lower at 13,015 tons against 50,700 tons a week ago; plate awards total 4545 tons.

AWARDS

NORTH ATLANTIC STATES

6700 Tons, Hartford-East Hartford, Conn., bridge, to American Bridge Co., Pittsburgh, and A. I. Savin Co., Hartford.

2600 Tons, Bethpage, N. Y, for Grumman Aircraft Engineering Co., to Lehigh Structural Steel Co., Allentown, Pa.

1550 Tons, Homestead, Pa., machine shop extension for Mesta Machine Co., to Bethlehem Steel Co., Bethlehem, Pa.

1390 Tons, Quonset Point, R. I., Navy barracks, to Harris Structural Steel Co., Plainfield, N. J.

800 Tons, Mariners Harbor, N. Y., additions to buildings Nos. 125 and 10, to Lehigh Structural Steel Co., Allentown, Pa.

730 Tons, Portsmouth, N. H., extension to Navy Yard shipways, to Pittsburgh-Des Moines Steel Co., Pittsburgh.

650 Tons, Monroe County, N. Y., State highway bridge, to American Bridge Co., Pittsburgh.

550 Tons, Stamford, Conn., Stamford Rolling Mills, to Lehigh Structural Steel Co., Allentown, Pa.

510 Tons, Aberdeen Proving Grounds, Md., buildings, to Pittsburgh-Des Moines Steel Co., Pittsburgh.

325 Tons, Westfield, N. Y., State highway bridge, to Bethlehem Steel Co., Lackawanna, N. Y.

315 Tons, Passaic, N. J., Central Avenue theater, to Selback-Meyer Co., West New York, N. J.

200 Tons, Jamestown, N. Y., factory addition for Marlin-Rockwell Co., to Bethlehem Steel Co., Lackawanna, N. Y.

200 Tons, Washington, addition to unit No. 4, Buzzard Point plant, Potomac Electric Co., to Fort Pitt Bridge Works Co., Pittsburgh.

170 Tons, Conshohocken, Pa., Walker Brothers Co. building addition, to Bethlehem Steel Co., Bethlehem, Pa.

150 Tons, Canaan-Enfield, N. H., State bridge, to American Bridge Co., Pittsburgh.

140 Tons, Ellenville, N. Y., State bridge RC-40-75, to American Bridge Co., Pittsburgh.

140 Tons, Beaver County, Pa., highway bridge, to Bethlehem Steel Co., Bethlehem, Pa.

115 Tons, Queens, N. Y., column cores for Procurement Division, to Lehigh Structural Steel Co., Allentown, Pa.

THE SOUTH

370 Tons, Nitro, W. Va., additions to American Viscose Corp. plant, to Lehigh Structural Steel Co., Allentown, Pa.

263 Tons, Little Rock, Ark., addition to post office and court house, to Arkansas Foundry Co., Little Rock, Ark., through Stephens Brown Co., general contractor.

250 Tons, Louisville, Ky., platform material for Louisville Gas & Electric Co., to Louisville Bridge & Iron Co., Louisville.

140 Tons, Broadway, Va., bridge project, to Roanoke Iron & Bridge Co., Roanoke, Va.

CENTRAL STATES

7000 Tons, Centerline, Mich., tank plant for Chrysler Corp., to Bethlehem Steel Co., Bethlehem, Pa.

6210 Tons, Charlestown, Ind., ordnance plant for E. I. du Pont de Nemours & Co., to Virginia Bridge Co., Roanoke, Va.

1100 Tons, Mansfield, Ohio, warehouse addition for Westinghouse Electric & Mfg. Co., to Bethlehem Steel Co., Bethlehem, Pa.

1050 Tons, Depue, Ill., furnace building for New Jersey Zinc Co., to Milwaukee Bridge Co., Milwaukee.

825 Tons, Vandalia, Ohio, Argonaut Realty Division office and factory for Aero-Products Division, to Burger Iron Works, Akron, Ohio.

760 Tons, Chicago, Goss Press Co. forge building, to Wendnagel & Co., Chicago.

700 Tons, Cowden, Ill., bridge for Nickel Plate Railroad, to American Bridge Co., Pittsburgh.

610 Tons, Flint, Mich., Argonaut Realty Division, factory and office building for AC Spark Plug Co., to Whitehead & Kales Co., Detroit.

500 Tons, Flint, Mich., addition to parts and service building, Chevrolet Motor Co., to Whitehead & Kales Co., Detroit.

500 Tons, Cleveland, addition for Cleveland Pneumatic Tool Co., to Burger Iron Works, Akron, through Sam W. Emerson Co., Cleveland.

407 Tons, Manitowoc, Wis., welding shop, Manitowoc Shipbuilding Co., to American Bridge Co., Pittsburgh.

340 Tons, Youngstown, repairs to Mahoning Avenue bridge, to Sause Structural Steel Co., Youngstown.

165 Tons, Marion, Mich., bridge, to Elkhart Bridge & Iron Works, Elkhart, Ind.

155 Tons, Detroit, office and factory building for Davis Tool & Engineering Co., to Wisconsin Bridge & Iron Co., Milwaukee.

110 Tons, Columbus, Ohio, Armstrong Furnace Co. building, to Truscon Steel Co., Youngstown.

100 Tons, Columbus, Ohio, Livingston Avenue bridge, to Case Crane & Kilbourne Jacobs Co., Columbus.

WESTERN STATES

1450 Tons, San Diego, Cal., two Navy land plane hangars, to Bethlehem Steel Co., Los Angeles, through M. H. Golden, San Diego, and Walter Trepte, San Diego, joint contractors.

975 Tons, Kettle Falls, Wash., three bridges for Bureau of Reclamation, to Pittsburgh-Des Moines Steel Co., Des Moines, Iowa.

500 Tons, San Diego, Cal., accessories overhaul shop for Navy, to American Bridge Co., Pittsburgh.

180 Tons, Marcus and Powell, Wash., underpasses, for Bureau of Reclamation, to Lakeside Bridge & Steel Co., Milwaukee.

135 Tons, Odair, Wash., spiral stairways for Grand Coulee Dam (Specification 1403-D), to St. Paul Foundry Co., St. Paul, Minn.

PENDING STRUCTURAL PROJECTS

NORTH ATLANTIC STATES

1200 Tons, Edgewood, Md., 18 warehouses for Government.

900 Tons, Bridgeton, N. J., warehouse for Owens-Illinois Glass Co.; bids Oct. 1.

700 Tons, Greenville, N. J., transfer bridges for Pennsylvania Railroad Co.

600 Tons, McKees Rocks, Pa., warehouse and office building for Federal Enameling & Stamping Co.

500 Tons, Boston, L Street station extension for Boston Edison Co.

450 Tons, Palmerton, N. J., addition to vertical slab plant for New Jersey Zinc Co.

450 Tons, Geneva, N. Y., addition for Geneva Forge Co.; specifications revised; bids taken Sept. 25.

350 Tons, Philadelphia, manufacturing building for Henry S. Disston & Sons; bids taken Sept. 25.

250 Tons, Gardenville, N. Y., State bridge PSC-5998.

190 Tons, Wilkes-Barre, Pa., State bridge.

180 Tons, Luzerne County, State highway bridge, route 169; bids Sept. 27.

175 Tons, State of New Jersey, highway bridge, route 39; bids Oct. 11.

155 Tons, Port Ivory, N. Y., processing building for Procter & Gamble Co.

135 Tons, Union County, N. J., State highway bridge.

130 Tons, Chapmans, Pa., State overpass.

120 Tons, Carroll County, Md., Big Pipe Creek State bridge.

CENTRAL STATES

4000 to 5000 Tons, Chester, Ill., bridge across Mississippi River; Massman Construction Co., Kansas City, Mo., general contractor.

350 Tons, Tuscola County, Mich., State bridge.

220 Tons, Indianapolis, coal bunker for Citizens Gas Co.

200 Tons, Hinckley, Minn., State bridge No. 5781; bids Sept. 30.

240 Tons, Chagrin Falls, Ohio, Fairmount Boulevard project; Galier Brothers, Cleveland, low bidders on general contract.

180 Tons, Saginaw, Mich., State bridges.

150 Tons, Hill City, S. D., State overhead bridge.

125 Tons, Rantoul, Ill., two war theaters, Chanute Field, for Government.

140 Tons, Huron County, Ohio, State bridge, A. J. Baltes, Norwalk, low bidder on general contract.

100 Tons, Wooster, Ohio, building for Steel Storage File Co.

Weekly Bookings of Construction Steel

Week Ended ——→	Sept. 24, 1940	Sept. 17, 1940	Aug. 27, 1940	Sept. 26, 1939	Year to Date 1940	Year to Date 1939
Fabricated structural steel awards	42,030	25,500	21,600	13,000	745,865	706,475
Fabricated plate awards	4,545	1,390	1,245	950	117,250	116,800
Steel sheet piling awards	2,170	2,640	0	1,200	38,210	67,880
Reinforcing bar awards	6,520	4,410	13,965	8,900	346,545	349,520
Total Letting of Construction Steel	55,265	33,940	36,810	24,050	1,247,870	1,240,675

WESTERN STATES

2000 **Tons,** Hawthorne, Nev., Naval ammunition depot buildings and services (Specification 9900); bids in.
1500 **Tons,** Oakland, Cal., two storehouses at Fleet Supply Base (Specification 10,-034); bids in.
955 **Tons,** Los Angeles, Los Angeles River bridge for Los Angeles Junction Railway Co.; bids to United States Engineer Oct. 15 instead of Oct. 16, as reported last week.
435 **Tons,** Glacier Park, Mont., Two Medicine River bridge; bids Sept. 27.
400 **Tons,** Hickam Field, T. H., Air Corps double hangar (Invitation QM-6812-41-14); bids Oct. 1.
270 **Tons,** Anchorage, Alaska, temporary hangar (Invitation 55).
165 **Tons,** Saltese, Mont., State bridge.
119 **Tons,** Mineral County, Mont., St. Regis River bridges; bids in.
110 **Tons,** Odair, Wash., erection platforms, Grand Coulee power plant for Bureau of Reclamation.
105 **Tons,** Earp, Cal., bulkhead gate frames and guides, specification No. 1436-D, for U. S. Bureau of Reclamation.
100 **Tons,** Shasta Dam, Cal., gate frames and girders; bids Sept. 30.
Unstated Tonnage, Earp, Cal., 100-ton gantry crane (Specification 1435-D); bids Oct. 10.

FABRICATED PLATES

AWARDS

1900 **Tons,** Brooklyn, pipe piles for Navy Yard, to American Rolling Mill Co., Middletown, Ohio, through Western Concrete Pile Co.
1000 **Tons,** New Orleans, four covered barges, for River Terminals Corp. for service on lower Mississippi River and Intra-Coastal Waterway, to Dravo Corp., Pittsburgh.
775 **Tons,** Brooklyn, subway route 110, section 10, to Alco Products Co., Dunkirk, N. Y.
360 **Tons,** Providence, R. I., 96,000 bbl. tank, for Richfield Oil Corp., to Bethlehem Steel Co., Bethlehem, Pa.
250 **Tons,** Ogden, Utah, 4 to 20-in. pipe (Bureau of Reclamation Specification 1409-D), to Southern Pipe & Casing Co., Azusa, Cal.
160 **Tons,** Josephtown, Pa., acid tanks for Monsanto Chemical Co., to Graver Tank & Mfg. Co., East Chicago, Ind.
100 **Tons,** Boulder City, Nev., turbine inlet pipes for Boulder power plant (Specification 1415-D), to Consolidated Steel Corp., Los Angeles.

PENDING PROJECTS

190 **Tons,** Gloucester, N. J., storage tanks for Sherwin-Williams Co., Cleveland.

SHEET PILING

AWARDS

1500 **Tons,** Freeport, Tex., Dow Chemical Co. expansion, to Carnegie-Illinois Steel Co., Pittsburgh, through Austin Co., Cleveland.
468 **Tons,** San Diego, Cal., Consolidated Aircraft addition, to Bethlehem Steel Co., San Francisco.
200 **Tons,** State of Oklahoma, project SAP-663-A, to Bethlehem Steel Co., Bethlehem, Pa.

PENDING PROJECTS

100 **Tons,** Chagrin Falls, Ohio, Fairmount Boulevard project; Galier Bros., Cleveland, low bidder on general contract.

Reinforcing Steel

Awards of 6,520 tons; 6,350 tons in new projects

AWARDS

ATLANTIC STATES

700 **Tons,** Willowbrook, Staten Island, N. Y., State hospital buildings, to Capitol Steel Corp., New York, through J. Weinstein & Rubin Corp.
700 **Tons,** Middle River, Md., Glenn L. Martin Co. plant, to Truscon Steel Co., Youngstown.
100 **Tons,** Philadelphia, pier addition for Navy Yard, to Truscon Steel Co., Youngstown, through Kaufman Construction Co.

SOUTH AND CENTRAL

636 **Tons,** Jacksonville, Fla., mesh for air base, to Truscon Steel Co., Youngstown.
550 **Tons,** Mansfield, Ohio, warehouse, Western Electric & Mfg. Co., to Bethlehem Steel Co., Bethlehem, Pa.
480 **Tons,** Savanna, Ill., Ordnance Depot buildings, to Bethlehem Steel Co., Bethlehem, Pa., through Hagerstrom Construction Co., contractor.
300 **Tons,** Decatur, Ala., grain elevator for Nebraska Consolidated Mills, to Truscon Steel Co., Youngstown.
246 **Tons,** Rutledge, Tex., Colorado River project (Invitation A-46,938-A), to Sheffield Steel Co., Kansas City.
236 **Tons,** Shreveport, La., mesh for city paving, to Truscon Steel Co., Youngstown.
200 **Tons,** Camp Shelby, Miss., mesh, to Truscon Steel Co., Youngstown.
200 **Tons,** Columbus, Ohio, Mount Calvary housing project, to Pollak Steel Co., Cincinnati, through H. M. Boyjohn, contractor.
170 **Tons,** Ida County, Iowa, paving, to Sheffield Steel Co., Kansas City, Mo.
138 **Tons,** State of Indiana, bridge 2015, to Missouri Rolling Mill Corp., St. Louis, Mo.
100 **Tons,** St. Louis County, Mo., Wabash Railroad bridge, to Laclede Steel Co., St. Louis.

WESTERN STATES

750 **Tons,** Los Angeles, County Quotation 5287, to Trojan Steel Co., Los Angeles.
250 **Tons,** Vancouver, Wash., court house, to Mercer Steel Co., Portland, Ore., through Ross B. Hammond, Portland, Ore., contractor.
200 **Tons,** Nyssa, Ore., undercrossing, to Truscon Steel Co., Portland, Ore., through Henry L. Horn, Caldwell, Idaho, contractor.
120 **Tons,** Mills, Wyo., Shoshone project (Invitation B-22,374-A), to Sheffield Steel Co., Kansas City.
118 **Tons,** Sunnyvale, Cal., laboratory building at Moffett Field, to Gilmore Fabricators, Inc., San Francisco, through Leo Epp, San Francisco, contractor.
100 **Tons,** Sunnyvale, Cal., utilities building at Moffett Field, to San Jose Steel Co., San Jose, Cal., through Carl N. Swenson, San Jose, contractor.

CANAL ZONE

220 **Tons,** Panama Canal, hospital and barracks CMQ 6708-41-2, to Truscon Steel Co., Youngstown, through McCarthy Brothers Construction Co.

PENDING REINFORCING BAR PROJECTS

ATLANTIC STATES

1200 **Tons,** Boston, post office garage; bids in.
550 **Tons,** Brooklyn, Long Island Railroad grade crossing elimination at Atlantic Avenue, contract No. 4; bids in.
500 **Tons,** New York, sewers, contract 34, Reiss & Weisner, Inc., engineer; bids in.
390 **Tons,** State of New Jersey, route 6, sections 8A and 8B, road and bridge construction; bids Oct. 11.
300 **Tons,** Pawtucket, R. I., housing project.
300 **Tons,** Brooklyn, foundations, building No. 77, Navy Yard; Turner Construction Co., contractor.
200 **Tons,** State of New Jersey, road and bridge construction, route 39, sections 1B and 10A; bids Oct. 11.
140 **Tons,** Rochester, N. Y., plant for Consolidated Machine Tool Co.
130 **Tons,** Neversink, N. Y., Delaware Aqueduct, contract No. 367.

CENTRAL STATES

900 **Tons,** Cleveland, Outhwaite housing project; James McHugh & Sons, Chicago, low bidders.
386 **Tons,** Columbus, Ohio, Rich Street housing project No. Ohio 1-3; bids Oct. 1.
350 **Tons,** Chester, Ill., bridge across Mississippi River; Massman Construction Co., Kansas City, Mo., low bidder on general contract.
179 **Tons,** San Juan County, N. M., highway work; Sharp & Fellows Construction Co., Los Angeles, contractor.
150 **Tons,** Huron County, Ohio, mats for State project; A. J. Baltes, Norwalk, low bidder on general contract.
100 **Tons,** Pike County, Ohio, mesh for State project; A. W. Burns Construction Co., Lima, low bidder on general contract.
100 **Tons,** Chicago, Northwest station, Commonwealth Edison Co.
100 **Tons,** Wichita, Kan., Cessna Aircraft Co.

WESTERN STATES

1340 **Tons,** Hawthorne, Nev., Naval ammunition depot buildings and services (Specification 9900); bids in.
165 **Tons,** Fort Mason, San Francisco, Alaskan air base list (Invitation 51); bids in.
114 **Tons,** Glacier Park, Mont., Two Medicine River bridges; bids Sept. 27.

Cast Iron Pipe

Bath, Me., has awarded 983 ft. of 6-in. pipe, 1000 ft. of 8-in., 2000 ft. of 10-in., 7300 ft. of 12-in. and 25 tons of fittings to Warren Foundry & Pipe Corp., Boston.

Providence, R. I., will shortly readvertise for bids on 400 tons of class B pipe, former bids having been rejected.

St. Andrews' Fire and Water Commission, Charleston, S. C., A. G. Goodwyn, chairman, plans pipe lines for water system, also for fire protection water supply. Cost about $40,-000. Bond issue in that amount is being arranged.

Water District No. 7, Jackson County, near Kansas City, Mo., recently organized, care of V. E. Phillips, Dierks Building, Kansas City, attorney and representative, plans pipe lines for water system in district bounded by Wornall Road, State Line, Seventy-ninth and Eighty-ninth Streets. Cost close to $60,000. An engineer will be engaged soon to make surveys and plans.

Brooklyn, Wis., plans pipe lines for water system and other waterworks installation. Cost about $72,000, of which $30,000 will be bond issue and remainder of fund secured through Federal aid. General Engineering Co., Portage, Wis., is consulting engineer.

Portals, N. M., plans pipe line extensions and replacements in water system and other waterworks installation. Cost about $85,000. Bond issue is being arranged in that amount.

King County Public Water District No. 6, Redondo Beach, near Seattle, Wash., Joseph O'Brien, secretary, plans about six miles of 8, 6 and 4-in. pipe for water system in northern part of district. Parker & Hill, Smith Tower Building, Seattle, are consulting engineers.

Crowley, Colo., plans pipe line from springs in Antelope Mesa district to municipality for main water supply. Cost about $40,000. Financing will be arranged through Federal aid.

Webster City, Wis., plans pipe lines for water system and other waterworks installation. Cost about $90,000. Financing is being arranged through Federal aid. General Engineering Co., Portage, Wis., is consulting engineer.

Pipe Lines

General Petroleum Corp. of California, Inc., 417 Montgomery Street, San Francisco, plans welded steel pipe line from oil field district at Cole Creek, Wyo., to Casper, Wyo., for crude oil transmission to terminal at latter place. Cost over $85,000.

Southern Gas Co., Kilgore, Tex., plans pressure pipe line extensions in system for natural gas transmission and distribution near Kilgore. H. C. Chambers, manager, in charge.

Davis & Co., Inc., Commerce Building, Houston, Tex., oil operator, plans new 10-in. welded steel pipe line from Rincon oil field, Starr County, to Brownsville, Tex., about 110 miles, for crude oil transmission to new refinery to be built at latter place. New line will have daily capacity of about 50,000 bbl. crude oil. Cost over $400,000 with booster stations and other operating facilities. Company also plans pipe line for natural gas transmission in connection with new gas recycling plant at Davis City, a recently established community near Rincon field, with daily capacity of about 60,-000,000 cu. ft. of natural gas.

Thibodaux, La., is completing plans for pressure pipe line system for natural gas distribution, including main welded steel pipe line for connection with supply source. Special election has been called Oct. 22 to approve bond issue of $175,000 for project.

New Mexico Gas Co., Albuquerque, N. M., has let contract to Fredell Construction Co., Stewart Building, Houston, Tex., for welded steel pipe line from connection with present pipe line system near Bloomfield, N. M., to point near Flora Vista on Animas River, about eight miles, for natural gas transmission. Cost close to $90,000.

Prices of Finished Iron and Steel...

Steel prices on these pages are f.o.b. basing points (in cents per lb.) unless otherwise indicated. On some products either quantity deductions or quantity extras apply. In many cases gage, width, cutting, physical, chemical extras, etc., apply to the base price. Actual realized prices to the mill, therefore, are affected by extras, deductions, and in most cases freight absorbed to meet competition.

Basing Point → / Product ↓	Pittsburgh	Chicago	Gary	Cleveland	Birmingham	Buffalo	Youngstown	Sparrows Point	Granite City	Middletown, Ohio	Gulf Ports, Cars	Pacific Ports, Cars	DELIVERED TO Detroit	New York	Philadelphia
SHEETS															
Hot rolled	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.20¢	2.10¢		2.65¢	2.20¢	2.34¢	2.27¢
Cold rolled[1]	3.05¢	3.05¢	3.05¢	3.05¢		3.05¢	3.05¢		3.15¢	3.05¢		3.70¢	3.15¢	3.39¢	3.37¢
Galvanized (24 ga.)	3.50¢	3.50¢	3.50¢		3.50¢	3.50¢	3.50¢	3.50¢	3.60¢	3.50¢		4.05¢		3.74¢	3.67¢
Enameling (20 ga.)	3.35¢	3.35¢	3.35¢	3.35¢			3.35¢		3.45¢	3.35¢		4.00¢	3.45¢	3.71¢	
Long ternes[2]	3.80¢		3.80¢									4.55¢			
Wrought iron	4.75¢														
STRIP															
Hot rolled[3]	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢			2.10¢		2.75¢	2.20¢		
Cold rolled[4]	2.80¢	2.90¢		2.80¢			2.80¢	(Worcester = 3.00¢)					2.90¢		
Cooperage stock	2.20¢	2.20¢			2.20¢		2.20¢								
Commodity C-R	2.95¢			2.95¢			2.95¢	(Worcester = 3.35¢)					3.05¢		
TIN PLATE Standard cokes (Per 100-lb. base box)	$5.00	$5.00	$5.00						$5.10						
BLACK PLATE 29 gage[5]	3.05¢	3.05¢	3.05¢						3.15¢			4.05¢ (10)			
TERNES, M'FG. Special coated (Per base box)	$4.30		$4.30						$4.40						
BARS															
Carbon steel	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢		(Duluth = 2.25¢)			2.50¢	2.80¢	2.25¢	2.49¢	2.47¢
Rail steel[6]	2.05¢	2.05¢	2.05¢	2.05¢	2.05¢	2.05¢					2.40¢	2.70¢			
Reinforcing (billet)[7]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢			2.50¢	2.55¢	2.25¢		
Reinforcing (rail)[7]	2.05¢	2.05¢	2.05¢	2.05¢	2.05¢	2.05¢	2.05¢				2.40¢	2.45¢	2.15¢		
Cold finished[8]	2.65¢	2.65¢	2.65¢	2.65¢		2.65¢							2.70¢		
PLATES															
Carbon steel	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢	2.10¢	(Coatesville and Claymont = 2.10¢)		2.45¢	2.65¢		2.29¢	2.15¢
Wrought iron	3.80¢														
Floor plates	3.35¢	3.35¢									3.70¢	4.00¢		3.71¢	
Alloy	3.25¢	3.25¢													
SHAPES															
Structural	2.10¢	2.10¢	2.10¢		2.10¢	2.10¢		(Bethlehem = 2.10¢)			2.45¢	2.75¢		2.27¢	2.215¢
SPRING STEEL C-R															
0.26 to 0.50 Carbon	2.80¢			2.80¢			(Worcester = 3.00¢)								
0.51 to 0.75 Carbon	4.30¢			4.30¢			(Worcester = 4.50¢)								
0.76 to 1.00 Carbon	6.15¢			6.15¢			(Worcester = 6.35¢)								
1.01 to 1.25 Carbon	8.35¢			8.35¢			(Worcester = 8.55¢)								
WIRE[9]															
Bright	2.60¢	2.60¢		2.60¢	2.60¢		(Worcester = 2.70¢)								
Galvanized	2.60¢	2.60¢		2.60¢	2.60¢		(Worcester = 2.70¢)								
Spring	3.20¢	3.20¢		3.20¢			(Worcester = 3.30¢)								
PILING															
Steel sheet	2.40¢	2.40¢				2.40¢					2.85¢	2.95¢			
IRON BARS															
Common		2.25¢			(Terre Haute, Ind. = 2.15¢)										
Refined	3.75¢														
Wrought	4.40¢														

[1] Mill run sheets are 10c. per 100 lb. less than base; and primes only, 25c. above base. [2] Unassorted 8-lb. coating. [3] Widths up to 12 in. [4] Carbon 0.25 per cent and less. [5] Applies to 29 gage within certain width and length limitations. [6] For merchant trade. [7] Straight lengths as quoted by distributers. [8] Also shafting. For quantities of 20,000 to 39,999 lb. [9] Carload lots to manufacturing trade. [10] Boxed.

SEMI-FINISHED STEEL

Billets, Blooms and Slabs

Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point (Rerolling only). Prices delivered Detroit are $2 higher f.o.b. Duluth, billets only, $2 higher.

	Per Gross Ton
Rerolling	$34.00
Forging quality	40.00

Shell Steel

Basic open hearth shell steel f.o.b. Pittsburgh and Chicago.

	Per Gross Ton
3 in. to 12 in.	$52.00
12 in. to 18 in.	54.00
18 in. and over	56.00

Note: The above base prices apply on lots of 1000 tons of a size and section to which are to be added extras for chemical requirements, cutting to length, or quantity. This type of steel is for hot rolled sections used for the making of shells and includes rounds, round squares, and special sections.

Sheet Bars

Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point, Md.

	Per Gross Ton
Open hearth or bessemer	$34.00

Skelp

Pittsburgh, Chicago, Youngstown, Coatesville, Pa., Sparrows Point, Md.

	Per Lb.
Grooved, universal and sheared	1.90c.

Wire Rods

(No. 5 to 9/32 in.)	*Per Lb.*
Pittsburgh, Chicago, Cleveland	2.00c.
Worcester, Mass.	2.10c.
Birmingham	2.00c.
San Francisco	2.50c.
Galveston	2.25c.

9/32 in. to 4/64 in., $3 a net ton higher. Quantity extras apply.

ROOFING TERNE PLATE

(F.o.b. Pittsburgh; Package, 112 Sheets)

	20x14 in.	20x28 in.
8-lb. coating I.C.	$6.00	$12.00
15-lb. coating I.C.	7.00	14.00
20-lb. coating I.C.	7.50	15.00
25-lb. coating I.C.	8.00	16.00
30-lb. coating I.C.	8.63	17.25
40-lb. coating I.C.	9.75	19.50

WIRE PRODUCTS

(To the Trade, f.o.b. Pittsburgh, Chicago, Cleveland, Birmingham)

	Base per Keg
Standard wire nails	$2.55
Coated nails	2.55
Cut nails, carloads	3.85

	Base per 100 Lb.
Annealed fence wire	$3.05

	Base Column
Woven wire fence*	67
Fence posts (carloads)	69
Single loop bale ties	56
Galvanized barbed wire†	70
Twisted barbless wire	70

*15½ gage and heavier. †On 80-rod spools in carload quantities.

Note: Birmingham base same on above items, except spring wire.

BOLTS, NUTS, RIVETS, SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

	Per Cent Off List
Machine and carriage bolts:	
½ in. and 6 in. and smaller	68½
Larger and longer up to 1 in.	66
1⅛ in. and longer	64
Lag bolts	66
Plow bolts, Nos. 1, 2, 3, and 7	68½
Hot pressed nuts; c.p.c., t-nuts; square, hex., blank or tapped:	
½ in. and smaller	67
9/16 in. to 1 in. inclusive	64
1⅛ in. to 1½ in. inclusive	62
1⅝ in. and larger	60

On above items, excepting plow bolts, additional allowance of 10 per cent for full container quantities.

On all of the above items there is an additional 5 per cent allowance for carload shipments.

Semi-fin. hexagon nuts	U.S.S.	S.A.E.
½ in. and smaller	67	70
9/16 to 1 in.	64	65
1⅛ in. through 1½ in.	62	62
1⅝ in. and larger	60	60

In full container lots, 10 per cent additional discount.

Stove bolts, packages, nuts loose	75 and 10
Stove bolts in packages, with nuts attached	75
Stove bolts in bulk	83½

On stove bolts freight allowed up to 65c. per 100 lb. based on Cleveland, Chicago, New York, lots of 200 lb. or over.

Large Rivets

(½ in. and larger)

	Base per 100 Lb.
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	$3.40

Small Rivets

(7/16 in. and smaller)

	Per Cent Off List
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	65 and 10

Cap and Set Screws

	Per Cent Off List
Milled hexagon head, cap screws, 1 in. dia. and smaller	50 and 10
Milled headless set screws, cut thread ¼ in. and larger	64
3/16 in. and smaller	73
Upset hex. head cap screws U.S.S. or S.A.E. thread 1 in. and smaller	70
Upset set screws, cup and oval points	75
Milled studs	52

Freight allowed up to 65c. per 100 lb. based on Cleveland, Chicago or New York on lots of 200 lb. or over.

NON-FERROUS PRICES

Cents per lb. for early delivery

	Sept. 18	Sept. 19	Sept. 20	Sept. 21	Sept. 23	Sept. 24
Copper, Electrolytic[1]	11.50	11.50	11.50	11.50	11.50	12.00
Copper Lake	11.50	11.50	11.50	11.50	11.50	12.00
Tin, Straits, New York	50.05	50.05	50.05	....	50.05	50.25
Zinc, East St. Louis[2]	6.85	6.85	6.85	6.85	7.25	7.25
Lead, St. Louis[3]	4.75	4.75	4.75	4.75	4.85	4.85

[1] Mine producers' quotations only, delivered Conn. Valley. Deduct ¼c. for approximate New York delivery price. [2] Add 0.39c. for New York delivery. [3] Add 0.15c. for New York delivery.

Warehouse Products

Cents per lb., Delivered

Tin	New York	Cleveland
Straits pig	51.75	53.25
Copper		
Electro	12.50	13.125
Castings	12.50	12.875
H. R. Sheets*	20.12	20.12
Seamless tubes*	20.62	20.62
Brass		
Yellow, sheets*	18.65	18.65
Yellow, rods*	13.67	13.67
Seamless tubes*	21.40	21.40
Zinc		
Slabs	8.25	8.10
Sheets, No. 9 casks	12.50	14.00
Lead		
American pig	6.00	5.40
Bar	7.95	8.00
Cut sheets	8.15	8.15
Antimony		
Asiatic	16.00	17.00
Aluminum		
Virgin, 99%	20.00	21.00
No. 1 remelt., 98-99%	18.00	18.50
Solder		
½ and ½	31.25	31.75
Babbitt		
Anti-friction grade	23.50	21.25

Old Metals

Cents per lb., New York

Buying prices are paid by dealers for miscellaneous lots from smaller accumulators. Selling prices are those charged to consumers after the metal has been prepared for their use.

	Dealers' Buying Prices	Dealers' Selling Prices
Copper		
Hvy. crucible	9.125	9.750
Hvy and wire	8.125	8.525
Light and bottoms	7.125	7.625
Brass		
Heavy	5.125	5.630
Light	4.125	4.875
No. 1 yel. turn.	5.00	6.00
No. 1 red or compo. turnings	7.625	8.125
Hvy. Mach. compo.	7.875	8.50
Lead		
Heavy	4.00	4.375
Aluminum		
Cast	8.50	9.50
Sheet	13.00	14.00
Zinc	4.00	4.750

Miscellaneous Non-Ferrous Prices

ALUMINUM, delivered: virgin, 99 per cent plus, 18c.-19c. a lb.; No. 12 remelt No. 2 standard, 18c.-19c. a lb. NICKEL, electrolytic, 35c.-36c. a lb. base refinery, lots of 2 tons or more. ANTIMONY, prompt: Asiatic, 16.50c. a lb., New York; American, 13c. a lb., f.o.b. smelter. QUICKSILVER, $173-175 per flask of 76 lb. BRASS INGOTS, commercial 85-5-5-5, 12c. a lb.

*These prices, which are also for delivery from Chicago warehouses, are quoted with the following percentages allowed off for extras: on copper sheets, 33⅓; on brass sheets and rods, 40; on brass tubes, 33⅓, and copper tubes, 40.

ALLOY STEEL

Alloy Steel Blooms, Billets and Slabs

Base per gross ton, f.o.b. Pittsburgh, Chicago, Canton, Massillon, Buffalo or Bethlehem.....$54.00

Alloy Steel Bars

Base per pound, f.o.b. Pittsburgh, Chicago, Buffalo, Bethlehem, Massillon or Canton.

Open-hearth grade	2.70c.
Delivered, Detroit	2.80c.

S.A.E. Series Numbers	Alloy Differential, per 100 Lb.
2000 (1.5 Ni)	$0.35
2100 (1.5 Ni)	0.75
2300 (3.5 Ni)	1.55
2500 (5 Ni)	2.25
3100 Ni-Cr	0.70
3200 Ni-Cr	1.35
3300 Ni-Cr	3.80
3400 Ni-Cr	3.20
4100 Cr-Mo (0.15 to 0.25 Mo.)	0.55
4100 Cr-Mo (0.25 to 0.40 Mo.)	0.75
x4340 Cr-Ni-Mo	1.65
4340 Cr-Ni-Mo	1.85
4600 Ni-Mo (0.2-0.3 Mo, 1.5-2 Ni)	1.10
5100 (0.60-0.90 Cr)	0.35
5100 (0.80-1.10 Cr)	0.45
5100 Cr spring steel	0.15
52-100 Cr. (electric furnace)	2.60
6100 Cr-V bar	1.20
6100 Cr-V spring steel	0.85
Cr-Ni-V	1.50
C-V	0.85

The above differentials are for hot rolled finished products. The differential for most grades in electric furnace steel is 50c. higher. Slabs with a section area of 16 in. and 2½ in. thick or over take the billet base.

Alloy Cold-Finished Bars

Base per pound, f.o.b. Pittsburgh, Chicago, Gary, Cleveland or Buffalo, 3.35c. Delivered Detroit, 3.45c., carlots.

STAINLESS AND HEAT-RESISTANT ALLOYS

(Base prices, cents per lb., f.o.b. Pittsburgh)

Chromium-Nickel

No.	304	302
Forging billets	21.25c.	20.40c.
Bars	25.00c.	24.00c.
Plates	29.00c.	27.00c.
Structural shapes	25.00c.	24.00c.
Sheets	36.00c.	34.00c.
Hot rolled strip	23.50c.	21.50c.
Cold rolled strip	30.00c.	28.00c.
Drawn wire	25.00c.	24.00c.

Straight-Chromium

No.	410	430	442	446
Bars	18.50c.	19.00c.	22.50c.	27.50c.
Plates	21.50c.	22.00c.	25.50c.	30.50c.
Sheets	26.50c.	29.00c.	32.50c.	36.50c.
H't strip	17.00c.	17.50c.	24.00c.	35.00c.
C'ld st.	22.00c.	22.50c.	32.00c.	52.00c.

TOOL STEEL

(F.o.b. Pittsburgh)

	Base per Lb.
High speed	67c.
High-carbon-chromium	43c.
Oil-hardening	24c.
Special	22c.
Extra	18c.
Regular	14c.

Prices for warehouse distribution to all points on or East of Mississippi River are 2c. a lb. higher. West of Mississippi quotations are 3c. a lb. higher.

ELECTRICAL SHEETS

(F.o.b. Pittsburgh)

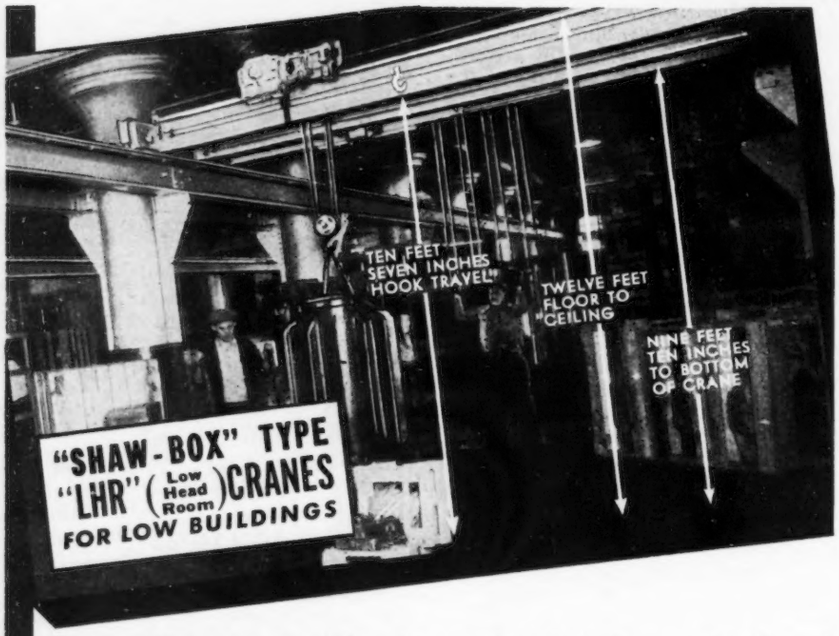
	Base per Lb.
Field grade	3.20c.
Armature	3.55c.
Electrical	4.05c.
Motor	4.95c.
Dynamo	5.65c.
Transformer 72	6.15c.
Transformer 65	7.15c.
Transformer 58	7.65c.
Transformer 52	8.45c.

Silicon strip in coils—Sheet price plus silicon sheet extra width extra plus 25c. per 100 lb. for coils. Pacific ports add 70c. a 100 lb.

CAST IRON WATER PIPE

	Per Net Ton
6-in. and larger, del'd Chicago	$54.80
6-in. and larger, del'd New York	52.20
6-in. and larger, Birmingham	46.00
6-in. and larger f.o.b. dock, San Francisco or Los Angeles or Seattle	56.00

Class "A" and gas pipe, $3 extra; 4-in. pipe is $3 a ton above 6-in. Prices shown are for lots of less than 200 tons. For 200 tons and over, 6-in. and larger is $45 at Birmingham and $53.80 delivered Chicago.


TEN FEET SEVEN INCHES HOOK TRAVEL
TWELVE FEET FLOOR TO CEILING
NINE FEET TEN INCHES TO BOTTOM OF CRANE
"SHAW-BOX" TYPE "LHR" (Low Head Room) CRANES FOR LOW BUILDINGS

LOW BUILDINGS? - - *You Needn't Raise the Roof To Have the Crane Service You Need!*

A "Shaw-Box" 3-ton capacity "LHR" Crane (Patented) installed in a building 12 feet high (inside), and 30 feet wide gives a hook lift of 10 ft. 7 inches and makes available more usable space beneath it than any other standard crane . . . This standardized, mass production built, 3-motor crane costs about the same as the average "electric hoist type" crane . . . Included in its modern design are the advantages of all steel totally enclosed construction; ball bearings throughout; speeds to suit today's tempo; top running trolley; and unusual accessibility of all parts.

Two standardized lines of Low Head Room Cranes. — "LHR" in 1, 2, and 3 tons capacity; and "L" in capacities 3½ to 15 tons . . . Send for dimension tables, descriptions, and illustrations of applications that increase production in limited spaces.

Makers of all types and sizes of Electric and Hand Operated Cranes; "Load Lifter" Electric Hoists; and the famous Portable Electric "Budgit" Hoists . . . ***Send all your inquiries for cranes and hoists to "Shaw-Box!"***

SHAW BOX CRANE & HOIST DIVISION

MANNING, MAXWELL & MOORE, INC.

402 Broadway — MUSKEGON, MICHIGAN

BOILER TUBES

Seamless Steel and Lap Weld Commercial Boiler Tubes and Locomotive Tubes. Minimum Wall.

(Net base prices per 100 ft., f.o.b. Pittsburgh, in carload lots)

	Seamless Cold Drawn	Seamless Hot Rolled	Lap Weld, Hot Rolled
1 in. o.d.	13 B.W.G.	$9.01	$7.82 ....
1¼ in. o.d.	13 B.W.G.	10.67	9.26 ....
1½ in. o.d.	13 B.W.G.	11.70	10.23 $9.72
1¾ in. o.d.	13 B.W.G.	13.42	11.64 11.06
2 in. o.d.	13 B.W.G.	15.03	13.04 12.38
2¼ in. o.d.	13 B.W.G.	16.76	14.54 13.79
2¼ in. o.d.	12 B.W.G.	18.45	16.01 15.16
2½ in. o.d.	12 B.W.G.	20.21	17.54 16.58
2¾ in. o.d.	12 B.W.G.	21.42	18.59 17.54
3 in. o.d.	12 B.W.G.	22.48	19.50 18.35
3½ in. o.d.	11 B.W.G.	28.37	24.62 23.15
4 in. o.d.	10 B.W.G.	35.20	30.54 28.66
4½ in. o.d.	10 B.W.G.	43.04	37.35 35.22
5 in. o.d.	9 B.W.G.	54.01	46.87 44.25
6 in. o.d.	7 B.W.G.	82.93	71.96 68.14

Extas for less carload quantities:

40,000 lb. or ft. over	Base
30,000 lb. or ft. to 39,999 lb. or ft.	5%
20,000 lb. or ft. to 29,999 lb. or ft.	10%
10,000 lb. or ft. to 19,999 lb. or ft.	20%
5,000 lb. or ft. to 9,999 lb. or ft.	30%
2,000 lb. or ft. to 4,999 lb. or ft.	45%
Under 2,000 lb. or ft.	65%

STEEL AND WROUGHT IRON PIPE AND TUBING

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

(F.o.b. Pittsburgh only on wrought iron pipe)

Base Price=$200 Per Net Ton

Butt Weld

Steel	Black	Galv.
⅛ in.	56	36
¼ to ⅜ in.	59	43½
½ in.	63½	54
¾ in.	66½	58
1 to 3 in.	68½	60½

Wrought Iron	Black	Galv.
¼ and ⅜ in.	+9	+10
½ in.	24	6½
¾ in.	30	13
1 and 1¼ in.	34	19
1½ in.	38	21½
2 in.	37½	21

Lap Weld

Steel		
2 in.	61	52½
2½ and 3 in.	64	55½
3½ to 6 in.	66	57¼
7 and 8 in.	65	55½
9 and 10 in.	64½	55
11 and 12 in.	63½	54

Wrought Iron		
2 in.	30½	15
2½ to 3½ in.	31½	17½
4 in.	33½	21
4½ to 8 in.	32½	20
9 to 12 in.	28½	15

Butt weld, extra strong, plain ends

Steel	Black	Galv.
⅛ in.	54½	41½
¼ to ⅜ in.	56½	45½
½ in.	61½	53½
¾ in.	65½	57½
1 to 3 in.	67	60

Wrought Iron		
¼ and ⅜ in.	+10	+43
½ in.	25	9
¾ in.	31	15
1 to 2 in.	38	22½

Lap weld, extra strong, plain ends

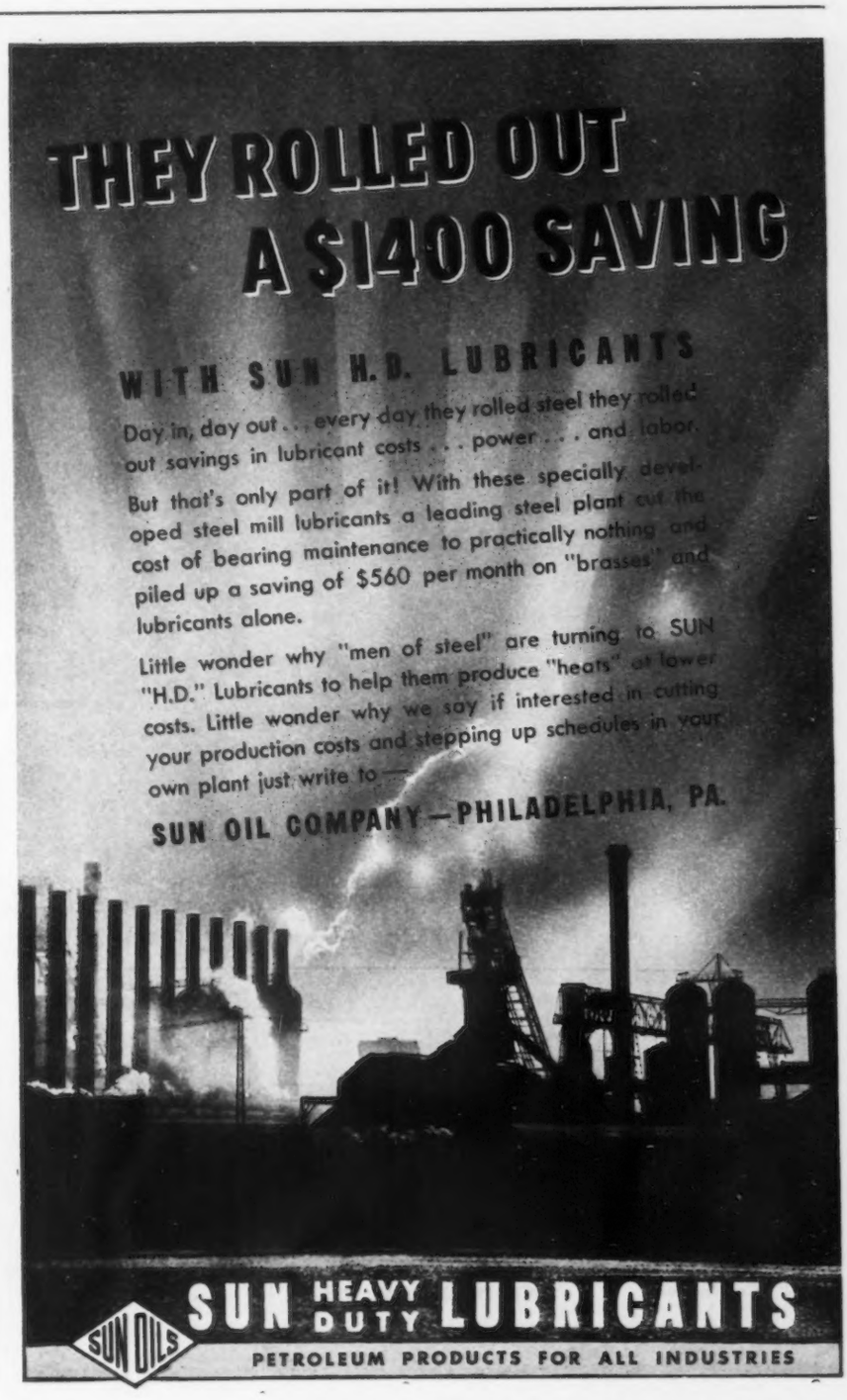
Steel		
2 in.	59	51½
2½ and 3 in.	63	55½
3½ to 6 in.	66½	59

	Black	Galv.
7 and 8 in.	65½	56
9 and 10 in.	64½	55
11 and 12 in.	63½	54

Wrought Iron		
2 in.	33½	18½
2½ to 4 in.	39	25½
4½ to 6 in.	37½	24
7 and 8 in.	38½	24½
9 to 12 in.	32	20½

On butt weld and lap weld steel pipe jobbers are granted a discount of 5%. On less-than-carload shipments prices are determined by adding 25 and 30% and the carload freight rate to the base card.

F.o.b. Gary prices are two points lower discount or $4 a ton higher than Pittsburgh or Lorain on lap weld and one point lower discount, or $2 a ton higher. on all butt weld 3 in. and smaller.


THEY ROLLED OUT A $1400 SAVING
WITH SUN H.D. LUBRICANTS
Day in, day out . . . every day they rolled steel they rolled out savings in lubricant costs . . . power . . . and labor.
But that's only part of it! With these specially developed steel mill lubricants a leading steel plant cut the cost of bearing maintenance to practically nothing and piled up a saving of $560 per month on "brasses" and lubricants alone.
Little wonder why "men of steel" are turning to SUN "H.D." Lubricants to help them produce "heats" at lower costs. Little wonder why we say if interested in cutting your production costs and stepping up schedules in your own plant just write to —
SUN OIL COMPANY—PHILADELPHIA, PA.
SUN OILS
SUN HEAVY DUTY LUBRICANTS
PETROLEUM PRODUCTS FOR ALL INDUSTRIES

ORES

Lake Superior Ores

Delivered Lower Lake Ports

	Per Gross Ton
Old range, bassemer, 51.50%..	$4.75
Old range, non-bessemer,51.50%	4.60
Mesaba, bessemer, 51.50%....	4.60
Mesaba, non-bessemer, 51.50%.	4.45
High phosphorus, 51.50%.....	4.35

Foreign Ores*

C.i.f. Philadelphia or Baltimore, Exclusive of Duty

	Per Unit
Algerian, low P, Cu free, dry, 55 to 58% Fe	12c.
Caucasian, washed, 52% Mn	60c.
African, Indian, 44 to 48% Mn	51c.
African, Indian, 49 to 51% Mn	56c.
Brazilian, 46 to 48% Mn	53c.
Cuban, del'd, duty free, 51% Mn	72c.

	Per Short Ton Unit
Tungsten, Chinese, Wolframite, duty paid, delivered	Nom.
Tungsten, domestic scheelite, delivered	Nom.
Chrome ore, lump c.i.f. Atlantic Seaboard, per gross ton: South African (low grade)	Nom.
Rhodesian, 45%	$23.50
Rhodesian, 48%	27.50

RAILS, TRACK SUPPLIES

F.o.b. Mill

Standard rails, heavier than 60 lb., gross ton	$40.00
Angle bars, 100 lb.	2.70

F.o.b. Basing Points

Light rails (from billets), gross ton	$40.00
Light rails (from rail steel), gross ton	39.00

	Base per Lb
Cut spikes	3.00c.
Screw spikes	4.55c.
Tie plates, steel	2.15c.
Tie plates, Pacific Coast	2.30c.
Track bolts, steam railroads	4.15c.
Track bolts, discount to jobbers all sizes (per 100 counts)	65-5

Basing points, light rails—Pittsburgh, Chicago, Birmingham; spikes and tie plates—Pittsburgh, Chicago, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minneaqua, Colo., Birmingham and Pacific Coast ports; tie plates alone—Steelton, Pa., Buffalo; spikes alone—Youngstown, Lebanon, Pa., Richmond, Va.

FLUORSPAR *Per Net Ton*

Domestic washed gravel, 85-5 f.o.b. Kentucky and Illinois mines, all rail	$20.00 to $21.00
Domestic, f.o.b. Ohio River landing barges	20.00 to 21.00
No. 2 lump, 85-5 f.o.b. Kentucky and Illinois mines	20.50 to 21.00
Foreign, 85% calcium fluoride, not over 5% Si., c.i.f. Atlantic ports, duty paid	25.00 to 25.50
Domestic No. 1 ground bulk, 96 to 98%, calcium fluoride, not over 2½% silicon, f.o.b. Illinois and Kentucky mines	31.00
As above, in bags, f.o.b. same mines	32.60

REFRACTORIES

Fire Clay Brick *Per 1000 f.o.b. Works*

Super-duty brick, at St. Louis	$60.80
First quality Pennsylvania, Maryland, Kentucky, Missouri and Illinois	47.50
First quality, New Jersey	52.50
Second quality, Pennsylvania, Maryland, Kentucky, Missouri and Illinois	42.75
Second quality, New Jersey	49.00
No. 1 Ohio	39.90
Ground fire clay, per ton	7.10

Silica Brick

Pennsylvania	$47.50
Chicago District	55.10
Birmingham	47.50
Silica cement, net ton (Eastern)	8.55

Chrome Brick *Net per Ton*

Standard f.o.b. Baltimore, Plymouth Meeting and Chester	$50.00
Chemically bonded f.o.b. Baltimore, Plymouth Meeting and Chester, Pa.	50.00

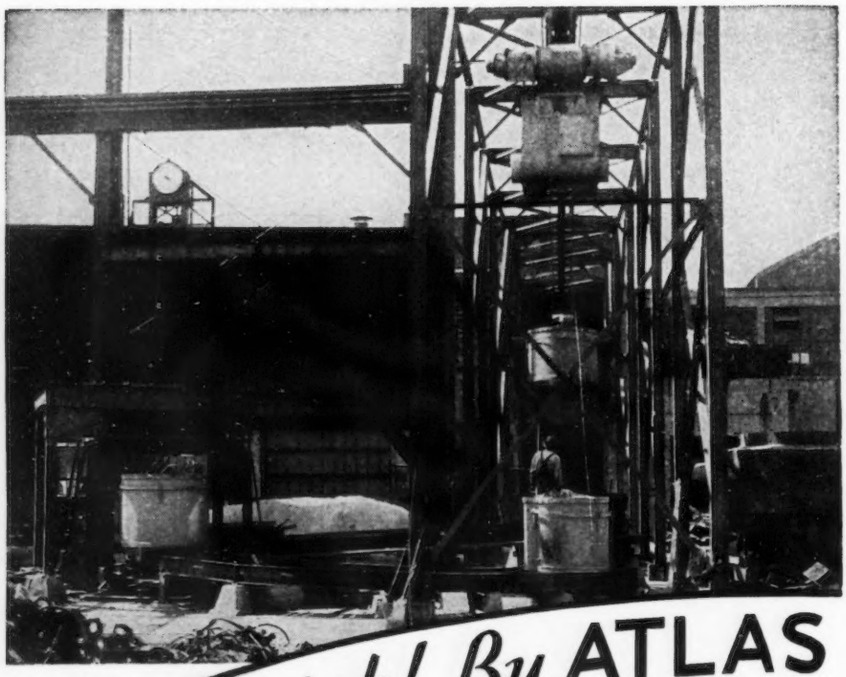
Magnesite Brick

Standard f.o.b. Baltimore and Chester	$72.00
Chemically Bonded, f.o.b. Baltimore	61.00

Grain Magnesite

Imported, f.o.b. Baltimore and Chester, Pa. (in sacks)	(—)*
Domestic, f.o.b. Baltimore and Chester in sacks	$40.00
Domestic, f.o.b. Chewelah, Wash. (in bulk)	22.00

*None available.



An Assist! By ATLAS

View at Prominent Iron Foundry

To Lower Costs!

Here Atlas-designed, Atlas-built equipment moves heavy scrap and other charging materials with consummate ease.

Monorail deposits empty bucket on roller conveyor. Bucket *rolls down* to scale platform, is charged with iron, weight read from yard crane cab. Scale platform lowers, turns, bucket *rolls down* to monorail for pick-up and charge to cupola.

A propitious circle, presaging profit at the year-end—and a definitely typical Atlas installation.

THE ATLAS CAR & MFG. CO.

Engineers **CLEVELAND, OHIO** *Manufacturers*

serving the world with mobile handling equipment

FERROALLOYS

Ferromanganese

F.o.b. New York, Philadelphia, Baltimore, Mobile or New Orleans.

Per Gross Ton

Domestic, 80% (carload) $120.00

Spiegeleisen

Per Gross Ton Furnace

Domestic, 19 to 21% $36.00
Domestic, 26 to 28% 49.50

Electric Ferrosilicon

Per Gross Ton, Delivered, Lump Size

50% (carload lots, bulk) $74.50*
50% (ton lots, packed) 87.00*
75% (carload lots, bulk) 135.00*
75% (ton lots, packed) 151.00*

Bessemer Ferrosilicon

Per Gross Ton, F.o.b. Jackson, Ohio

10.00 to 10.50% $33.50

For each additional 0.50% silicon up to 12%, 50c. per ton is added. Above 12% add 75c. per ton.
For each unit of manganese over 2% $1 per ton additional.
Base prices at Buffalo are $1.25 a ton higher than at Jackson.

Silvery Iron

Per Gross Ton, F.o.b. Jackson, Ohio

5.00 to 5.50% $27.50

For each additional 0.5% silicon up to 12%, 50c. a ton is added. Above 12% add 75c. a ton.
The lower all-rail delivered price from Jackson or Buffalo is quoted with freight allowed. Base prices at Buffalo are $1.25 a ton higher than at Jackson.
Manganese, each unit over 2%, $1 a ton additional. Phosphorus 0.75% or over, $1 a ton additional.

Ferrochrome

Per Lb. Contained Cr., Delivered Carlots Lump Size, on Contract

4 to 6% carbon ..... 11.00c.
2% carbon ..... 17.50c.
1% carbon ..... 18.50c.
0.10% carbon ..... 20.50c.
0.06% carbon ..... 21.00c.

Spot prices are ¼c. per lb. of contained chromium higher.

Silico-Manganese

Per Gross Ton, Delivered, Lump Size, Bulk, on Contract

3% carbon $113.00*
2.50% carbon 118.00*
2% carbon 123.00*
1% carbon 133.00*

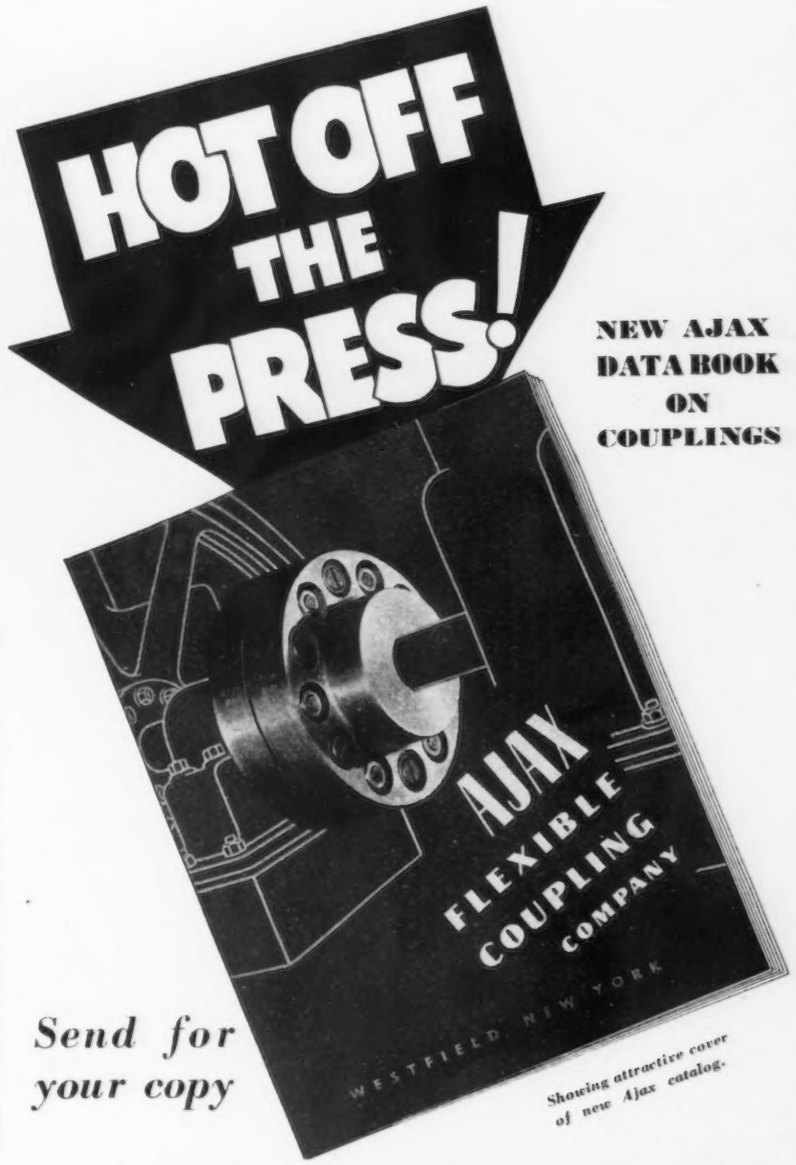
Other Ferroalloys

Ferrotungsten, per lb. contained W, del. carload ... $2.00
Ferrotungsten, 100 lb. and less 2.25
Ferrovanadium, contract, per lb. contained V., del'd $2.70 to $2.90†
Ferrocolumbium, per lb. contained columbium, f.o.b. Niagara Falls, N. Y., ton lots ..... $2.25†
Ferrocarbontitanium, 15 to 18% Ti, 7 to 8% C, f.o.b. furnace, carload and contract, per net ton $142.50
Ferrocarbontitanium, 17 to 20% Ti, 3 to 5% C, f.o.b. furnace, carload and contract, per net ton $157.50
Ferrophosphorus, electric or blast furnace material, in carloads, f.o.b. Anniston, Ala., for 18%, with $3 unitage, freight equalized with Rockdale, Tenn., per gross ton 58.50
Ferrophosphorus, electrolytic 23-26% in carlots, f.o.b. Monsanto (Siglo), Tenn., 24%, per gross tons, $3 unitage, freight equalized with Nashville 75.00
Ferromolybdenum, per lb. Mo, f.o.b. furnace ..... 95c.
Calcium molybdate, per lb. Mo, f.o.b. furnace ..... 80c.
Molybdenum oxide briquettes 48-52% Mo, per lb. contained Mo, f.o.b. Langeloth, Pa. 80c.

*Spot prices are $5 per ton higher.
†Spot prices are 10c. per lb. of contained element higher.

FUEL OIL

No. 3, f.o.b. Bayonne, N. J. ..... 4.10c.
No. 6, f.o.b. Bayonne, N. J. ..... 2.98c.
No. 5 Bur. Stds., del'd Chicago 3.25c.
No. 6 Bur. Stds., del'd Chicago 2.75c.
No. 3 distillate, del'd Cleveland 5.25c.
No. 4 industrial, del'd Cleveland 5.00c.
No. 5 industrial, del'd Cleveland 3.75c.
No. 6 industrial, del'd Cleveland 3.25c.



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COKE

Per Net Ton

Furnace, f.o.b. Connellsville, prompt	$4.50 to $4.75
Foundry, f.o.b. Connellsville, prompt	$5.25 to 5.50
F'dry, by-product, Chicago	10.50
F'dry, by-product, New England	12.50
Foundry, by-product, Newark or Jersey City	$11.30 to $11.90
F'dry, by-product, Philadelphia	11.13
F'dry, by-product, Cleveland	11.05
F'dry, by-product, Cincinnati	10.50
Foundry, Birmingham	7.50
F'dry, by-product, St. Louis	$10.75 to $11.00
Foundry, from Birmingham, f.o.b. cars dock Pacific ports	$14.75

BRITISH

British

Per Gross Ton, f.o.b. United Kingdom Ports

Ferromanganese, export	£17 18s.
Tin plate, per base box.	32s. to 33s.
Steel bars, open hearth	£13 9s.
Beams, open hearth	£12 2s. 6d.
Channels, open hearth	£12 2s. 6d.
Angles, open hearth	£12 2s. 6d.
Black sheets, No. 24, gage	£18 17s. 6d. max.*; £18 17s. 6d. min.**
Galvanized sheets, No. 24 gage	£19 10s. max.*; £19 10s. min.**

*Empire markets only.
**Other than Empire markets.

PIG IRON (Per Gross Ton)

Prices delivered various consuming points indicated by bold italics

	No. 2 Foundry	Basic	Bessemer	Malleable	Low Phos.
Boston	***$24.50***	***$24.00***	***$25.50***	***$25.00***	.....
Brooklyn	***26.50***	.....	.....	***27.00***	.....
Jersey City	***25.53***	***25.03***	***26.53***	***26.03***	.....
Philadelphia	***24.84***	***24.34***	***25.84***	***25.34***	.....
Bethlehem, Pa.	$24.00	$23.50	$25.00	$24.50	.....
Everett, Mass.	24.00	23.50	25.00	24.50	.....
Swedeland, Pa.	24.00	23.50	25.00	24.50	.....
Steelton, Pa.	.....	23.50	.....	.....	28.50
Birdsboro, Pa.	24.00	23.50	25.00	24.50	28.50
Sparrows Point, Md.	24.00	23.50	.....	.....	.....
Erie, Pa.	23.00	22.50	24.00	23.50	.....
Neville Island, Pa.	23.00	22.50	23.50	23.00	.....
Sharpsville, Pa.	23.00	22.50	23.50	23.00	.....
Buffalo	23.00	22.00	24.00	23.50	28.50
Cincinnati	***23.44***	***23.61***	.....	***24.11***	.....
Canton, Ohio	***24.39***	***23.89***	***24.89***	***24.39***	.....
Mansfield, Ohio	***24.94***	***24.44***	***25.44***	***24.94***	.....
St. Louis	***23.50***	***23.02***	.....	.....	.....
Chicago	23.00	22.50	23.50	23.00	.....
Granite City, Ill.	23.00	22.50	23.50	23.00	.....
Cleveland	23.00	22.50	23.50	23.00	.....
Hamilton, Ohio	23.00	22.50	.....	23.00	.....
Toledo	23.00	22.50	23.50	23.00	.....
Youngstown	23.00	22.50	23.50	23.00	.....
Detroit	23.00	22.50	23.50	23.00	.....
St. Paul	***25.63***	.....	***26.13***	***25.63***	.....
Duluth	23.50	.....	24.00	23.50	.....
Birmingham	19.38*	18.00	24.00	.....	.....
Los Angeles, San Francisco and Seattle	***27.50***	.....	.....	.....	.....
Provo, Utah	22.00	.....	.....	.....	.....
Montreal†	27.50	27.50	.....	28.00	.....
Toronto†	25.50	25.50	.....	26.00	.....

GRAY FORGE		CHARCOAL	
Valley or Pittsburgh fce.	$22.50	Lake Superior fce.	$27.00
		Delivered Chicago	30.34

Base prices are subject to an additional charge for delivery within the switching limits of the respective districts.

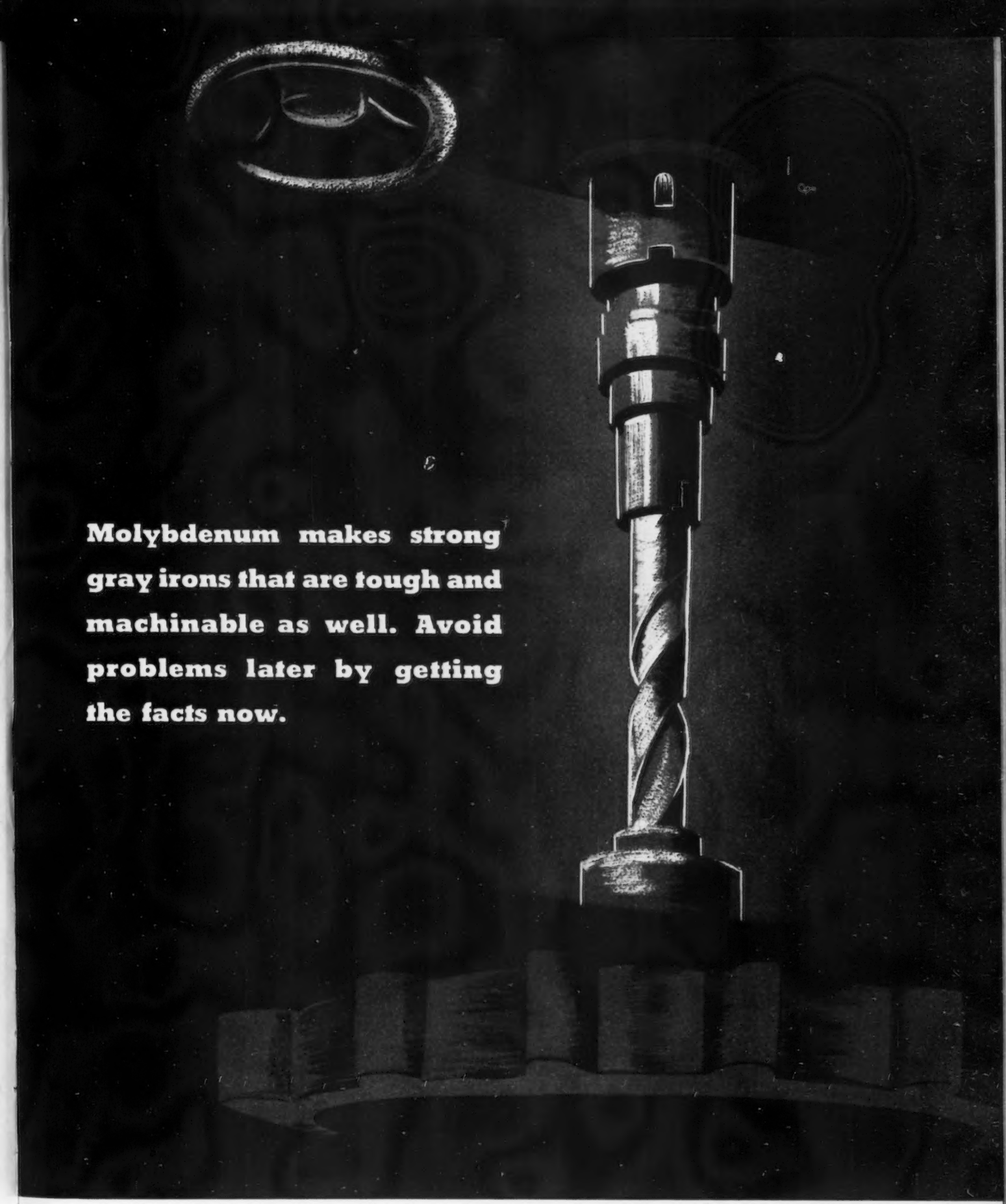
*Delivered prices on Southern iron for shipment to Northern points are 38c. a ton below delivered prices from nearest Northern basing point on iron with phosphorus content of 0.70 per cent and over. †On all grades 2.25 per cent silicon and under is base. For each 25 points of silicon over 2.25 per cent an extra of 25c. is charged.

WAREHOUSE PRICES

(Base Prices, Dollars per 100 lb., Delivered Metropolitan Areas)

	Pittsburgh	Chicago	Cleveland	Philadelphia	New York	Detroit	Buffalo	Boston	Birmingham	St. Louis	St. Paul	Milwaukee	Los Angeles
Sheets, hot rolled	$3.15	$3.05	$3.15	$3.35	$3.38	$3.23	$3.05	$3.51	$3.45	$3.18	$3.30	$3.48	$4.30
Sheets, cold rolled	....	4.10	4.05	4.05	4.40	4.30	4.30	4.58	....	4.12	4.35	4.43	6.50
Sheets, galvanized	4.75	4.60	4.42	4.50	4.30	4.64	4.00	4.66	4.75	4.95	4.75	4.98	5.25
Strip, hot rolled	3.40	3.40	3.30	3.75	3.76	3.48*	3.62	3.86	3.70	3.52	3.65	3.73	...
Strip, cold rolled	3.20	3.30	3.20	3.31	3.31	3.20	3.22	3.26	....	3.41	3.83	3.54	...
Plates	3.40	3.55	3.40	3.55	3.76	3.60	3.62	3.85	3.35	3.47	3.80	3.68	4.00
Structural shapes	3.40	3.55	3.58	3.55	3.75	3.65	3.40	3.85	3.55	3.47	3.80	3.68	4.00
Bars, hot rolled	3.35	3.50	3.25	3.85	3.84	3.43	3.35	3.98	3.50	3.62	3.75	3.63	4.15
Bars, cold finished	3.65	3.75	3.75	4.06	4.09	3.80	3.75	4.13	4.43	4.02	4.34	3.88	6.60
Bars, ht. rld. SAE 2300	7.20	7.10	7.30	7.31	7.35	7.42	7.10	7.50	....	7.47	7.45	7.33	9.40
Bars, ht. rld. SAE 3100	5.75	5.65	5.85	5.86	5.90	5.97	5.65	6.05	....	6.02	6.00	5.88	8.55
Bars, cd. drn. SAE 2300	8.15	8.15	8.15	8.56	8.59	8.45	8.15	8.63	....	8.52	8.84	8.38	10.65
Bars, cd. drn. SAE 3100	6.75	6.75	6.75	7.16	7.19	7.05	6.75	7.23	....	7.12	7.44	6.98	9.80

BASE QUANTITIES: Hot rolled sheets, cold rolled sheets, hot rolled strip, plates, shapes and hot rolled bars, 400 to 1999 lb.; galvanized sheets, 150 to 1499 lb.; cold rolled strip, extras apply on all quantities; cold finished bars, 1500 lb. and over; SAE bars, 1000 lb. and over. Exceptions: Chicago, galvanized sheets, 500 to 1499 lb.; Philadelphia, galvanized sheets, one to nine bundles, cold rolled sheets, 1000 to 1999 lb.; Detroit, galvanized sheets, 500 to 1499 lb.; Buffalo, cold rolled sheets, 500 to 1500 lb., galvanized sheets, 450 to 1499 lb.; Boston, cold rolled and galvanized sheets, 450 to 3749 lb.; Birmingham, hot rolled sheets, strip and bars, plates and shapes, 400 to 3999 lb., galvanized sheets, 500 to 1499 lb.; St. Louis, cold rolled sheets, 400 to 1499 lb., galvanized sheets, 500 to 1499 lb.; Milwaukee, cold rolled sheets, 400 to 1499 lb., galvanized sheets, 150 to 499 lb.; New York, hot rolled sheets, 0 to 1999 lb., cold rolled sheets, 400 to 1499 lb.; St. Paul, galvanized and cold rolled sheets, any quantity, hot rolled bars, plates, shapes, hot rolled sheets, 400 to 14,999 lb.; Los Angeles, hot rolled sheets, bars, plates, shapes, cold rolled sheets, 300 to 1999 lb., galvanized sheets, 150 to 1049 lb. Extras for size, quality, etc., apply on above quotations. *12 gage and heavier, $3.23.



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MOLY

Sales Possibilities

. . . CONSTRUCTION, PLANT EXPANSION AND EQUIPMENT BUYING

North Atlantic

● **RCA Mfg. Co., Inc.**, 411 Fifth Avenue, New York, radio equipment, talking machines and parts, has let general contract to H. K. Ferguson Co., Cleveland, for four one-story additions, about 100,000 sq. ft. floor space, to branch plant at St. Clair Street and Belt Railway, Indianapolis. Cost over $500,000 with equipment.

Grumman Aircraft Engineering Corp., Bethpage, N. Y., military and other airplanes, has acquired 64 acres adjoining plant for one-story additions for expansion in parts manufacture and assembling. Cost close to $1,000,000 with equipment.

Consolidated Edison Co. of New York, Inc., 4 Irving Place, has filed plans for new five-story coal and ash-handling tower, 147 x 339 ft., at power station, 430 East Thirty-ninth Street. Cost over $80,000 with conveyors and other mechanical-handling equipment.

Savage Arms Corp., Utica, N. Y., plans modernization in group of buildings at plant, idle for some time, with equipment for production of aircraft machine guns and cannons for Government. Cost about $17,600,000, majority of fund to be used for purchase of equipment. Financing will be provided by War Department, which will hold title to equipment.

Continental Oil Co., 10 Rockefeller Plaza, New York, plans new natural gasoline and pressure-maintenance plant in Hull-Silk oil field, Archer County, Tex., including compressor station, boiler house, steel tank units and other facilities. Cost close to $400,000 with equipment.

Air Reduction Sales Co., 60 East Forty-second Street, New York, industrial gases, welding apparatus, etc., has let general contract to Austin Co., Cleveland, for one-story addition to oxygen plant at 181 Pacific Avenue, Jersey City, N. J., 40 x 100 ft. Cost over $50,000 with equipment.

G. & G. Precision Works, 110-22 Sutphin Boulevard, Long Island City, precision mechanical equipment, has leased space in building at 5-33 Forty-eighth Avenue, for plant, expanding present capacity.

American Cyanamid & Chemical Corp., 30 Rockefeller Plaza, New York, has approved plans for two additions to branch plant at Kalamazoo, Mich., for production of chemicals for paper industry. Cost over $100,000 with equipment.

P. Ballantine & Sons, 57 Freeman Avenue, Newark, N. J., brewers, will begin superstructure for five-story and basement addition, 70 x 90 ft., for storage and distribution, for which general contract recently was let to Turner Construction Co., New York. Cost close to $100,000 with equipment. J. S. Shanley, 33 Washington Street, Newark, is architect.

National Pneumatic Co., New Brunswick Avenue and Albert Street, Rahway, N. J., door control equipment, interlocking devices, etc., plans one-story addition, about 60,000 sq. ft. floor space. Cost over $100,000 with equipment.

Hercules Powder Co., Delaware Trust Building, Wilmington, Del., has acquired former mill of Sunbury Converting Works, Belvidere, N. J., totaling over 125,000 sq. ft. of floor space, on 270 acre tract. New owner will equip at once for branch mill for production of powder and explosives. Company also has authorized rebuilding of section of powder works at Kenvil, N. J., recently destroyed by explosion, with loss totaling over $1,000,000.

Yarnall-Waring Co., 102 Mermaid Lane, Philadelphia, valves, water gages and kindred engineering specialties, has asked bids on general contract for one-story addition to machine shop. Cost over $50,000 with equipment.

Robinson Clay Products Co., Second National Bank Building, Akron, Ohio, sewer pipe, drain tile, etc., plans installation of mixing, grinding, pressing and other machinery in new branch plant at Pottstown, Pa., comprising two main one-story units, 105 x 440 ft., and 210 x 240 ft., with auxiliary buildings, including a machine shop. Also will install oil-fired continuous tunnel kilns, conveying and other mechanical-handling equipment. Cost close to $700,000 with machinery, all to be electric-operated. General contract has been let to Jacob R. Fox, Jr., Luzerne and D Streets, Philadelphia. Ballinger Co., 105 South Twelfth Street, Philadelphia, is architect and engineer.

Buffalo District

● **Metal & Alloys Specialties Co.**, 1875 Elmwood Avenue, Buffalo, brass and bronze castings, etc., plans one-story addition to foundry. Cost over $50,000 with equipment.

Bell Aircraft Corp., 2050 Elmwood Avenue, Buffalo, military and other airplanes, has leased about 175,000 sq. ft. additional floor space in building now occupied in part, for expansion in parts production and assembling divisions. Cost over $2,000,000 with machinery. Company also is considering new hangar at Buffalo airport for final assembling and testing.

Premier Mill Corp., Genesee Street, Geneva, N. Y., manufacturer of colloid mills and other machinery for processing industries, plans modernization and expansion in plant. Cost over $50,000 with equipment.

New England

● **United Aircraft Corp.**, East Hartford, Conn., has let general contract to Turner Construction Co., New York, for one-story addition to Pratt & Whitney Division plant, aircraft engines and parts. Cost about $2,000,000 with machinery. Also has made award to Edwin Moss & Son, Inc., 555 Grant Street, Bridgeport, Conn., for one-story addition, 139 x 290 ft., to plant of Vought-Sikorsky Division, Stratford, Conn. Cost close to $200,000 with equipment. Plans are under way for additional units at both plants. Albert Kahn Associated Architects & Engineers, Inc., Detroit, is architect and engineer.

Commanding Officer, Ordnance Department, Springfield Armory, Springfield, Mass., asks bids until Oct. 4 for 2708 water chests for firearms, caliber .50, with hose assembly, steel balls, pump blades, single roller chain, hose clamps, packing, nuts and screws, plungers, filler cap strainers, pump body gaskets, etc. (Circular 75).

Springfield Bronze & Aluminum Co., Hendee Street and Page Boulevard, Springfield, Mass., bearings, bushings, etc., is erecting one-story addition, for which general contract recently was let to Adams & Ruxton Construction Co., 1387 Main Street. Cost about $45,000 with equipment. H. L. Sprague, 1570 Main Street, is architect.

Washington District

● **Chemical Warfare Service**, Edgewood Arsenal, Edgewood, Md., asks bids until Sept. 30 for power presses and dies (Circular 344), portable elevators (Circular 348), centrifugal pumps (Circular 350); until Oct. 1 for storage tanks (Circular 349).

Westinghouse Electric & Mfg. Co., East Pittsburgh, has approved plans for one-story addition to branch plant at 2519 Wilkens Avenue, Baltimore, radio equipment, for expansion in assembling division. Cost over $85,000 with equipment.

Crown Cork & Seal Co., Eastern Avenue and Kresson Street, Highlandtown, Baltimore, has rejected bids for one-story addition, and will ask new bids soon on general contract. Cost over $50,000 with equipment. Lucius R. White, Jr., 10 West Chase Street, is architect.

Procurement Division, Veterans Administration, Washington, asks bids until Sept. 30 for welding and cutting equipment (Circular 114), hydraulic automobile lift and air compressor (Circular 107); until Oct. 1, hydraulic automobile lift (Circular 117).

Bureau of Yards and Docks, Navy Department, Washington, asks bids (no closing date stated) for extensions in water system at marine barracks, Quantico, Va., including additions to filter plant, and installation of mixing tank, clay feeder, motor-driven centrifugal pumps, one 300-kw. gasoline engine-driven alternator with exciter, sludge-blanket type settling tanks, pressure type filters and accessory equipment (Specification 10025).

General Purchasing Officer, Panama Canal, Washington, asks bids until Sept. 30 for brake shoes for 33-in. diameter cast-iron wheels, 48 hand barrel trucks, 2000 lb. steel foundry nails, and other equipment (Schedule 4344), 4000 helical steel buffer casting springs, 10,000 brass nuts, 288 contractors' wheelbarrows (Schedule 4353), portable air compressor (Schedule 4360); until Oct. 1, woodworking machines (Schedule 4362); until Oct. 2, conduit pipe clamps, electric flashlights and other equipment (Schedule 4361).

Bureau of Supplies and Accounts Navy Department, Washington, asks bids until Oct. 1 for naval brass forgings (Schedule 3267), adjustable box and socket wrenches (Schedule 3266), blank steel shells (Schedule 3269), steel wire nails (Schedule 3192) for Eastern and Western Navy yards.

South Atlantic

● **Ecusta Paper Corp.**, Brevard, N. C., manufacturer of cigarette papers, has let general contract to Fiske-Carter Construction Co., Masonic Temple, Greenville, S. C., for one-story additions to mill to double present capacity, including processing units, machine building for three new paper-making machines and auxiliaries, storage and distributing buildings and other structures. Cost close to $2,000,000 with machinery. J. E. Sirrine & Co., Greenville, are consulting engineers.

Southern Bell Telephone & Telegraph Co., Hurt Building, Atlanta, Ga., has let general contract to Barge Thompson Co., 136 Ellis Street, for one-story equipment storage and distributing building, 130 x 142 ft., with garage, service and repair facilities, at Miami, Fla. Cost close to $65,000 with equipment.

South Central

● **Curtis Lighting, Inc.**, 1123 West Jackson Boulevard, Chicago, lighting fixtures, parts, etc., has asked bids on general contract for one-story branch plant at Paducah, Ky. Cost close to $75,000 with equipment. S. Lester Daly, 605 Perry Street, Metropolis, Ill., is architect.

Nebraska Consolidated Mills Co., 1521 North Sixteenth Street, Omaha, Neb., has let general contract to Jones-Hettelsater Construction Co., Mutual Building, Kansas City, Mo., for new branch flour mill at Decatur, Ala., for initial capacity of 750 bbl. per day, with

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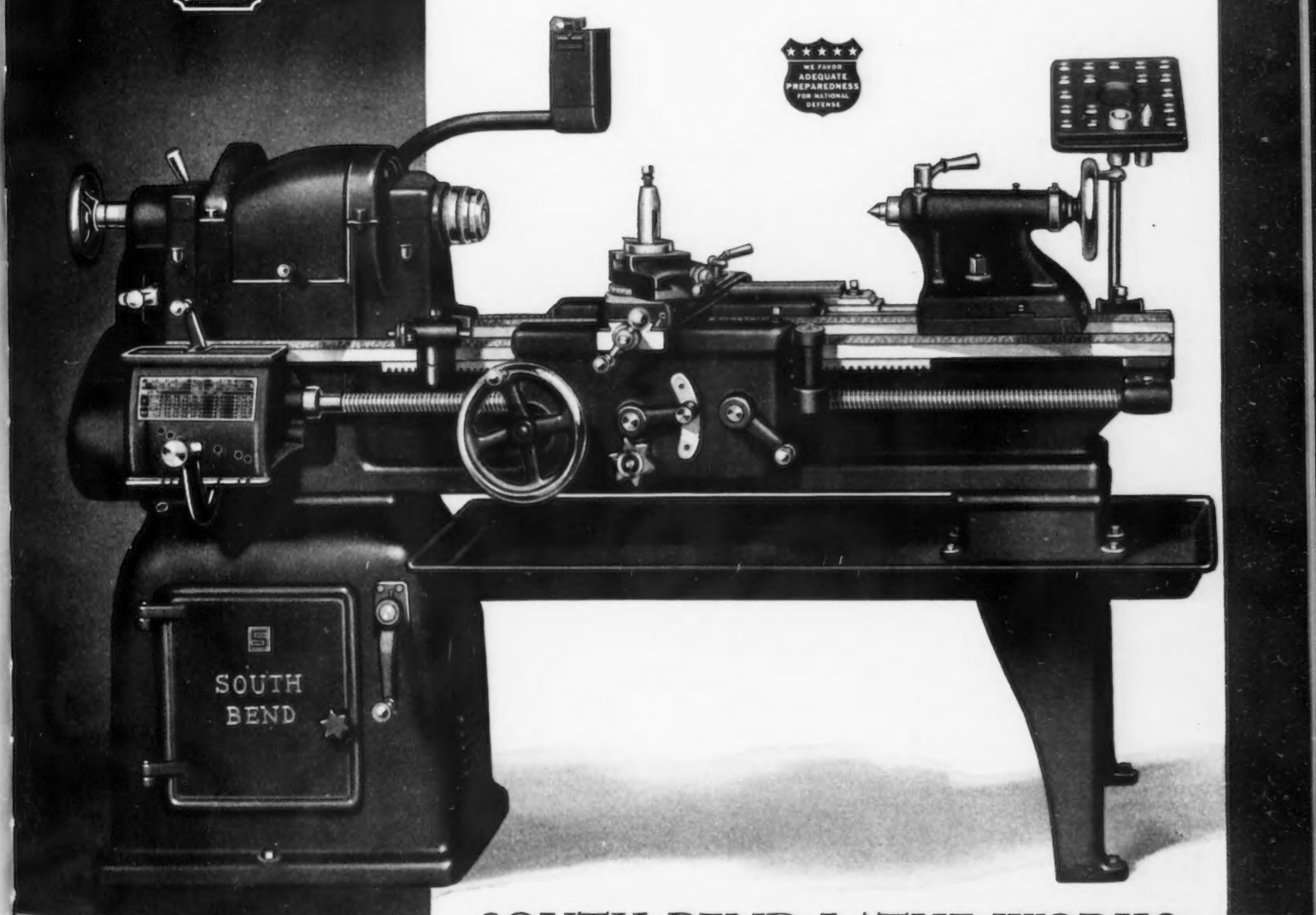

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grain elevator of 400,000 bu. capacity. Cost over $400,000 with mechanical-handling and other equipment. Horner & Wyatt, Board of Trade Building, Kansas City, Mo., are consulting engineers.

Ashland Oil & Refining Co., Ashland, Ky., plans expansion and improvements in oil refinery at Catlettsburg, Ky., to increase crude oil-handling capacity and gasoline production. Also new steel storage tanks and other operating facilities. Cost about $350,000 with equipment.

Southwest

● **Gaylord Container Corp.**, Pulp and Paper Division, 2820 South Eleventh Street, St. Louis, plans expansion and improvements in pulp and paper mill at Bogalusa, La., including new one- and multi-story buildings, and equipment. Company is arranging financing in amount of $5,000,000, considerable part of fund to be used for purpose noted.

W. S. Dickey Clay Mfg. Co., New York Life Building, Kansas City, Mo., sewer pipe, building tile and other structural clay products, plans one-story machine shop and steam power house at new plant at Monroe and Guinotte Avenues, on which work is scheduled to begin early in 1941. Cost about $400,000 with mixing, grinding, pressing, conveying and other equipment, including tunnel kilns.

United States Engineer Office, Little Rock, Ark., asks bids until Sept. 30 for a gantry crane for Nimrod dam, near Ola, Ark. (Circular 25).

City Council, Clay Center, Kan., asks bids until Oct. 9 for extensions and improvements in municipal power plant, including steam turbine-generator unit and accessories, condenser, boiler and auxiliary equipment. Cost about $150,000. Burns & McDonnell Engineering Co., 107 West Linwood Boulevard, Kansas City, Mo., is consulting engineer.

Texas Steel Co., 3901 Hemphill Street, Fort Worth, Tex., George Armstrong, head, will take bids soon on general contract for new two-story shop, 42 x 110 ft. Cost close to $50,000 with equipment. Wyatt Hedrick, First National Bank Building, is architect.

Motor Fuels Corp., Levelland, Tex., has approved plans for expansion and improvements in oil refinery for increase in gasoline production, including new fractionating tower, cracking machinery, two boiler units and accessories, air compressor and auxiliary equipment. Cost about $100,000.

Western Pa. District

● **Pittsburgh Steel Co.**, Grant Building, Pittsburgh, has approved plans for two one-story additions to plant at Monessen, Pa., each about 45 x 225 ft. Cost over $100,000 with equipment.

American Viscose Corp., Delaware Trust Building, Wilmington, Del., has asked bids on general contract for addition to steam power plant at rayon mill, Nitro, W. Va. Cost over $60,000 with equipment. Ballinger Co., 105 South Twelfth Street, Philadelphia, is architect and engineer.

American Sterilizer Co., 1230 Plum Street, Erie, Pa., sterilizing vessels and equipment, will take bids at once on general contract for two-story addition, 20 x 120 ft. Cost about $50,000 with equipment. Meyers & Johnson, Commerce Building, are architects.

Michigan District

● **National Brass Co.**, Madison Avenue, Grand Rapids, Mich., brass and bronze hardware, screw machine products, etc., has let general contract to Osterink Construction Co., Grand Rapids, for one-story addition. Cost over $60,000 with equipment. Harry L. Mead, Grand Rapids, is architect.

Briggs Mfg. Co., 11631 Mack Avenue, Detroit, automobile bodies, etc., plans modernizing six-story branch plant at 12825 Taft Avenue, Cleveland, for production of die-castings for aircraft parts, a new line of production for company. Cost over $200,000.

Superior Metal Products Co., Auburn Heights, Mich., stamped metal goods, plans one-story addition. Cost close to $50,000 with equipment. W. D. Knox, Pontiac, Mich., is architect.

Yellow Truck & Coach Mfg. Co., Pontiac, Mich., has let general contract to Darin & Armstrong, Inc., 2041 Fenkel Street, Detroit, for one-story addition, 120 x 500 ft. Cost about $200,000 with equipment. Albert Kahn Associated Architects & Engineers, Inc., Detroit, is architect and engineer.

Ohio and Indiana

● **Bickford Tool Co.**, 3220 South Street, Cincinnati, machine tools, has let general contract to Austin Co., Cleveland, for one-story addition, 134 x 250 ft. Cost close to $150,000 with equipment.

Aeronautical Corp. of America, Inc., Middletown, Ohio, airplanes and parts, plans one-story additions for expansion in parts production and assembling departments, including equipment. Cost over $600,000 with machinery.

Ohio Tool Co., 3160 West 106th Street, Cleveland, special tools, dies, etc., has let general contract to J. L. Hunting Co., Ninth-Chester Building, for one-story addition. Cost about $45,000 with equipment. Wallace H. Hatch, Hippodrome Annex, is engineer.

Atlas Powder Co., Delaware Trust Building, Wilmington, Del., will begin work early in October on new shell-loading plant on 21,000-acre tract in Portage and Trumbull Counties, near Ravenna, Ohio, to be built and operated under lease agreement with Federal Government, which will hold title to property. It will include machine shops, power house and other mechanical structures. Cost about $14,200,000 with equipment.

Columbus Anvil & Forging Co., 129 West Frankfort Street, Columbus, Ohio, has let general contract to N. J. Mulligan, 496 Hutton Place, for one-story addition, 60 x 120 ft., with extension, 15 x 41 ft. Cost close to $50,000 with equipment.

Marmon-Herrington Co., Washington and Harding Streets, Indianapolis, commercial automobiles, has let general contract to H. K. Ferguson Co., Hanna Building, Cleveland, for one-story addition. Cost over $75,000 with equipment. F. W. Daniels, 1650 Hanna Building, is architect.

Delco-Remy Division, General Motors Corp., Anderson, Ind., automotive starting and lighting equipment, has approved plans for one-story addition for production of aluminum castings for airplane engines of Allison Engineering Division, Indianapolis, an affiliated interest. Cost close to $250,000 with equipment.

Middle West

● **American Stock Gear Co.**, 646 West Washington Street, Chicago, has let general contract to Clearing Industrial District, 6455 South Central Avenue, for new one-story plant, 150 x 204 ft., at 6665 West 65th Street. Cost close to $125,000 with equipment. John S. Cromelin, 6455 South Central Avenue, is architect.

Industrial Oil & Chemical Co., 1227 West Twenty-second Street, Rockford, Ill., has let general contract to Lundin & Grip, Inc., Reliable Building, for one-story addition, 90 x 152 ft., for storage and distribution. Cost close to $45,000 with equipment.

Liquid Carbonic Co., 3100 South Kedzie Avenue, Chicago, bottling and brewing machinery, industrial gases, etc., has let general contract to Kaiser-Ducett Co., 80 East Jackson Boulevard, for one-story addition for expansion in industrial gas division. Cost over $60,000 with equipment. Lieberman & Hein, 190 North State Street, are engineers.

City Council, Algona, Iowa, asks bids until Oct. 1 for addition to municipal power plant, 78 x 112 ft., including two 25,000-gal. underground oil storage tanks, cooling towers, pumps, crane and other equipment. Burns & McDonnell Engineering Co., 107 West Linwood Boulevard, Kansas City, Mo., is consulting engineer.

Malleable Iron Range Co., North Spring Street, Beaver Dam, Wis., stoves, ranges, etc., will proceed with erection of two-story addition, 100 x 250 ft. Cost over $75,000 with equipment. R. R. Boyd, 112 South Spring Street, is architect.

Bureau of Reclamation, Denver, asks bids until Sept. 30 for one steel gate-handling frame for downstream face of Marshall Ford dam, Colorado River project, Tex. (Specifications 1426-D).

Lindberg Engineering Co., 1431 Fulton Street, Chicago, tempering furnaces, parts, etc., has let general contract to George A. Prusener, 3719 North Central Park Avenue, for one-story assembly shop, 50 x 100 ft. Cost about $45,000 with equipment. Robert C. Ostergren, 4300 North Clark Street, is architect.

Pacific Coast

● **Lockheed Aircraft Corp.**, Burbank, Cal., has let general contract to F. B. Aldous & Son, 8327 Wilshire Boulevard, Beverly Hills, Cal., for three one-story additions to final assembling building, about 100,000 sq. ft. floor space. Cost over $500,000 with equipment. John and Donald B. Parkinson, Title Insurance Building, Los Angeles, are architects. Another award has been made to H. W. Baum, 232 South Van Ness Avenue, Los Angeles, for one-story addition, 100 x 300 ft., for storage and distribution, and one-story extension to research laboratory. Cost over $80,000 with equipment.

Seattle-Tacoma Shipbuilding Corp., Seattle, has let general contract to General Construction Co., 3804 Iowa Street, for initial construction of new shipbuilding plant on 25-acre tract on Harbor Island, near Eleventh Avenue, S.W. Work will include five shipways, outfitting pier 2500 ft. long, metal-working and woodworking shops, boiler house, pumping station, other shops and auxiliary buildings. Cost about $5,000,000. Plant will be used to build destroyers for Navy Department. Company is a subsidiary of Todds Shipyards Corp., New York.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Oct. 1 for two universal and tool-grinding machines (Schedule 3181), one jig-boring machine (Schedule 3182) and six turret lathes (Schedule 3183) all motor-driven, for Keyport, Wash., yard.

Canada

● **Steel Fabricating & Welding, Ltd.**, Hatt Street, Hamilton, Ont., has approved plans for one-story addition, 65 x 105 ft. Cost over $50,000 with equipment.

Midland Shipbuilding Co., Ltd., Midland, Ont., plans shop additions at shipyard, and modernization and improvements in present structures. Cost about $100,000 with equipment.

Anaconda American Brass, Ltd., Eighth Street, New Toronto, Ont., has appointed Ross & Macdonald, 1010 St. Catharine Street West, Montreal, architects, to prepare plans for addition to cost about $250,000.

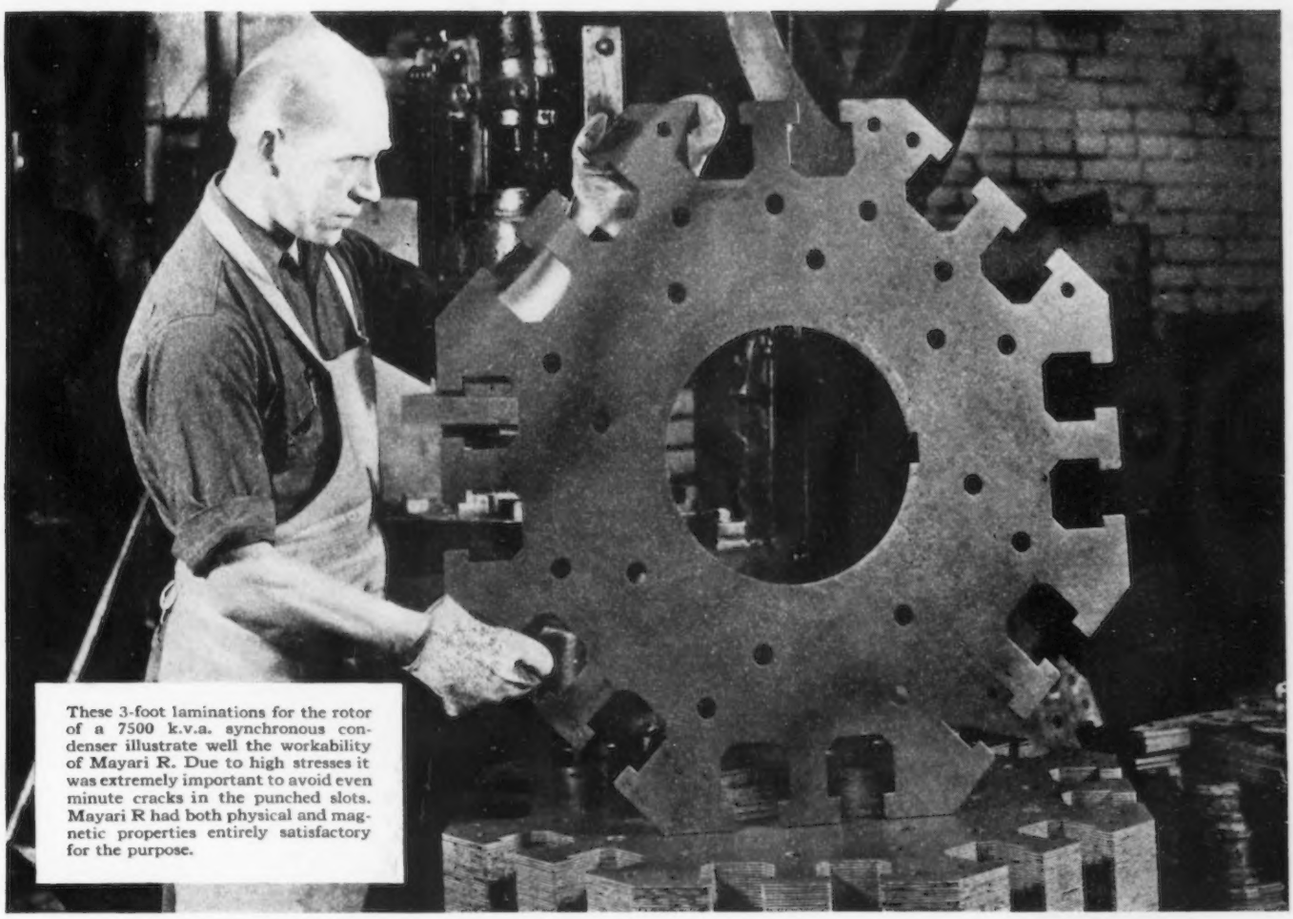
Dominion Engineering Works, Ltd., First Avenue, Lachine, Que., has awarded contract to Foundation Co. of Canada, Ltd., 1538 Sherbrooke Street, for plant addition to cost $75,000.

Nichols Chemical Co., Ltd., 1111 Beaver Hall Hill, Montreal, has started ground work at Valleyfield, Que., in connection with $1,000,000 plant for manufacture of sulphuric acid. Plant will be financed by Canadian Government and operated by company.

Kelsey Wheel Co., Ltd., 300 Ellis Avenue, Windsor, Ont., has awarded contract to Allan Construction Co., Ltd., 44 Wyandotte Street East, for plant addition to cost $30,000.

North American Cyanamid, Ltd., Niagara Falls, Ont., has awarded contract to Chemical Construction Co., New York, for plant at Port Robinson, Ont., to cost $12,000,000. Findlay & Mann, 449 Queen Street, Niagara Falls, are architects.

Consider the advantages



These 3-foot laminations for the rotor of a 7500 k.v.a. synchronous condenser illustrate well the workability of Mayari R. Due to high stresses it was extremely important to avoid even minute cracks in the punched slots. Mayari R had both physical and magnetic properties entirely satisfactory for the purpose.

# of MAYARI R

The use of Mayari R brings definite benefits to the manufacturer of many products without the handicaps of increased cost or radical change in production methods. When this high-tensile, low-alloy steel is used, strength of parts is increased to about one and one-half times that of mild carbon steel. As much as 40% dead weight can be saved without sacrifice in strength. Corrosion resistance is stepped up to five or six times that of mild carbon steel and there is a substantial increase in impact and abrasion resistance.

In the shop, Mayari R is handled like mild carbon steel. Only minor allowances need be made for Mayari R's greater strength. It is welded readily by all the usual gas and electric methods, without air hardening effects. No heat treatment is necessary with Mayari R either before or after fabrication. It has full physical properties just as it comes from the mill and is used "as rolled."

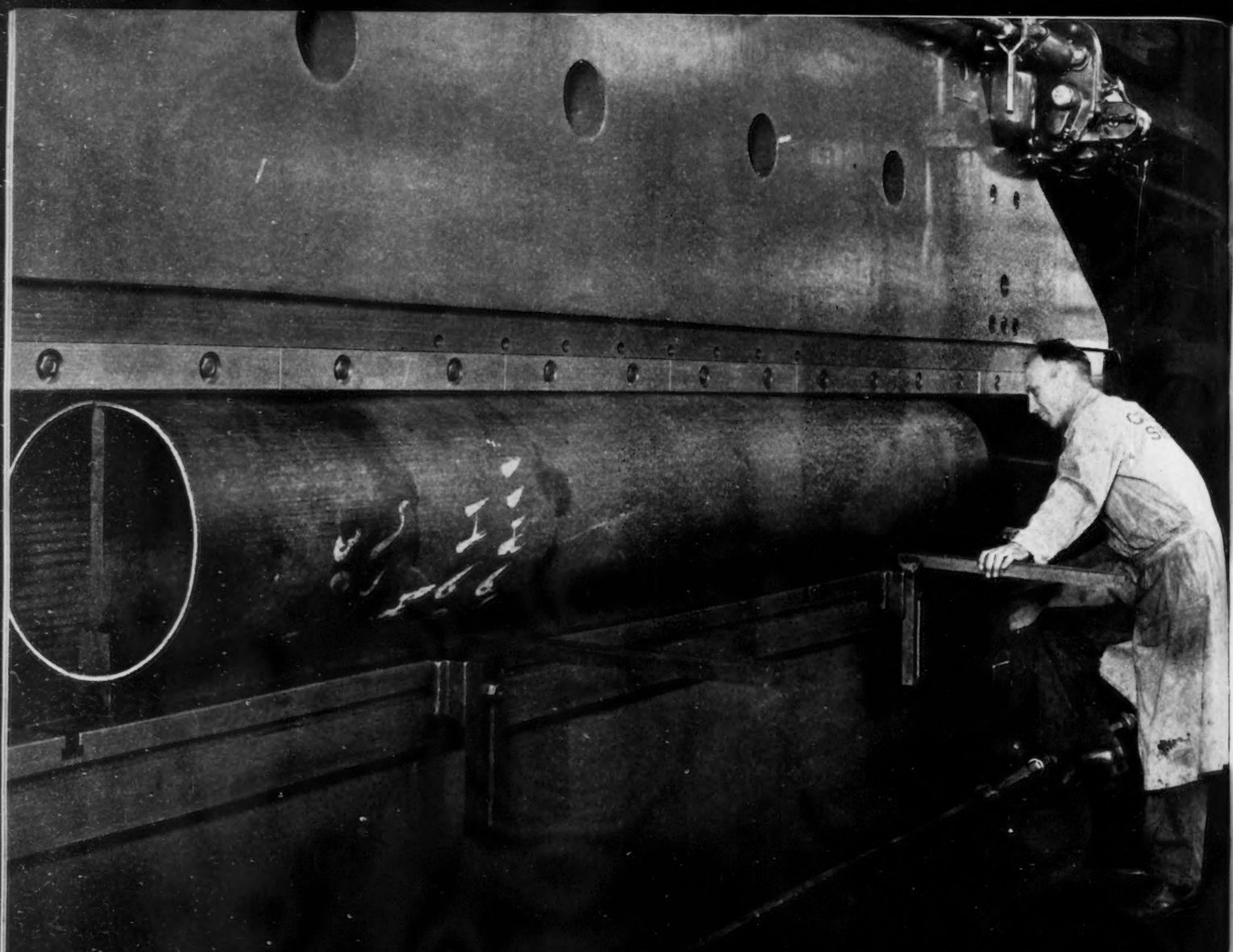
Perhaps most important of all, the finished-job cost of Mayari R is practically equal to that of ordinary steel, with advantages of reduced dead weight, increased capacity, longer life, reduced maintenance, and longer spread of investment.

Catalog on request—A catalog describing Mayari R will be sent on request.

BETHLEHEM STEEL

BETHLEHEM STEEL COMPANY

THE IRON AGE, published every Thursday by the *CHILTON CO. (INC.)*. Publication office, Chestnut & 56th Sts., Philadelphia, Pa. Editorial and Executive Offices, 100 E. 42nd St., New York, N. Y. Entered as second class matter November 8, 1932, at the Post Office at Philadelphia under Act of March 3, 1879. $6.00 a year in U. S., Canada $8.50, Foreign $12.00. Vol. 146, No. 13.



Pipes . . . Tubes . . . Posts

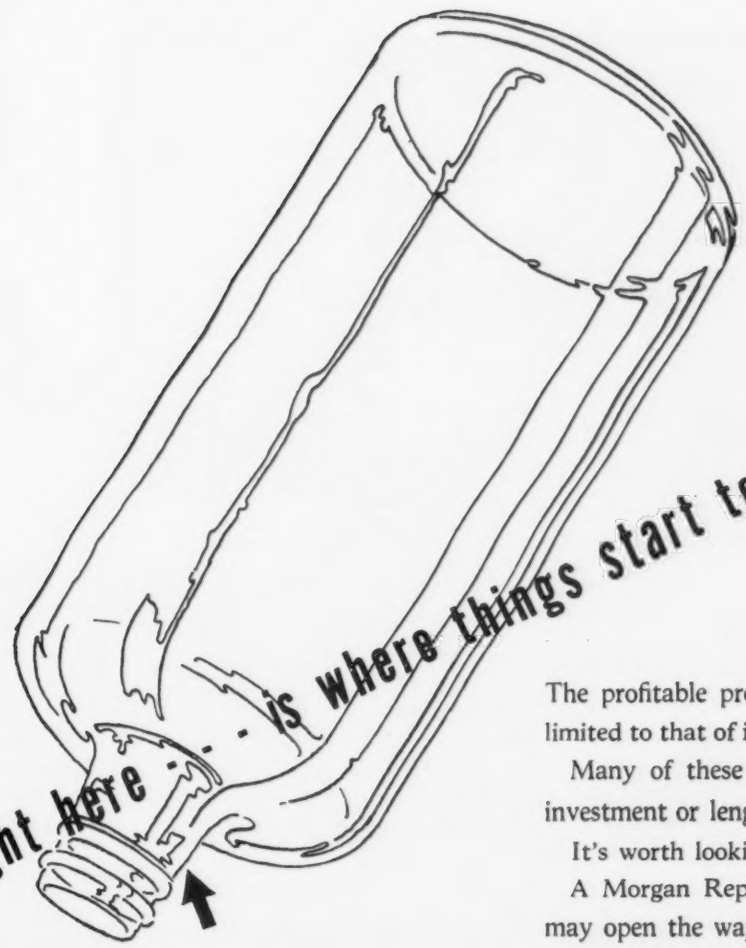
. . . are easily and accurately formed on Cincinnati Press Brakes.

Cincinnati Press Brakes are also used for crimping sheet and plate before rolling to eliminate flats at seam edges of rolled shapes.

Write for recommendations on your job.

THE CINCINNATI SHAPER COMPANY, CINCINNATI, OHIO

SHAPERS · SHEARS · BRAKES



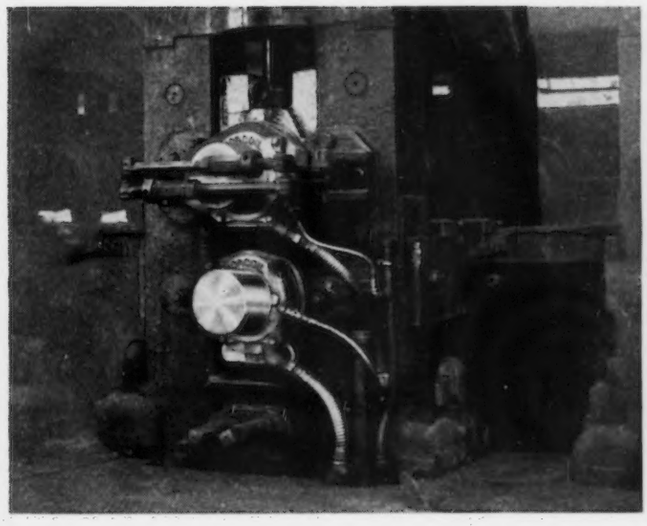
The profitable production capacity of your mill is limited to that of its "Bottle Necks."

Many of these can be removed without major investment or lengthy shutdown.

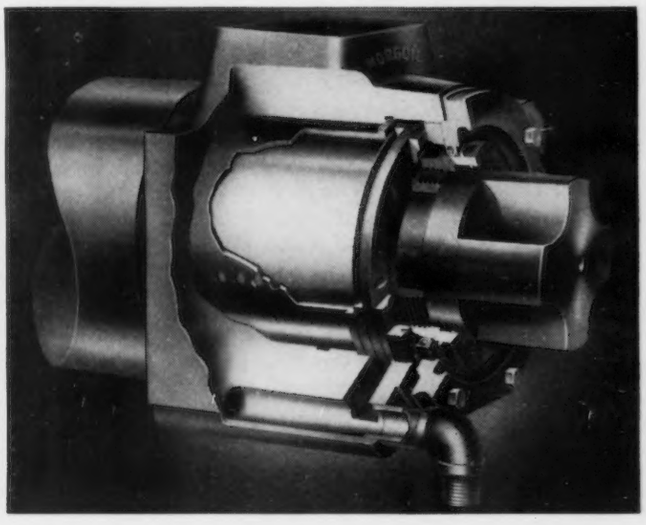
It's worth looking into.

A Morgan Report will give you the facts, and may open the way to new profits for you without heavy investment.

R-77



Morgan Roll Stands, as built today, include Morgoil Bearings with Axial Pass Alignment Clamps and other important features that save time, power, and improve output and product.



Morgoil Bearings ride on a film of oil. They cannot be equalled for low coefficient of friction, high load capacity, and freedom from wear. Available in all sizes and capacities for replacement.

MORGAN
WORCESTER
ENGINEERS AND
MANUFACTURERS

CONTINUOUS ROLLING MILLS

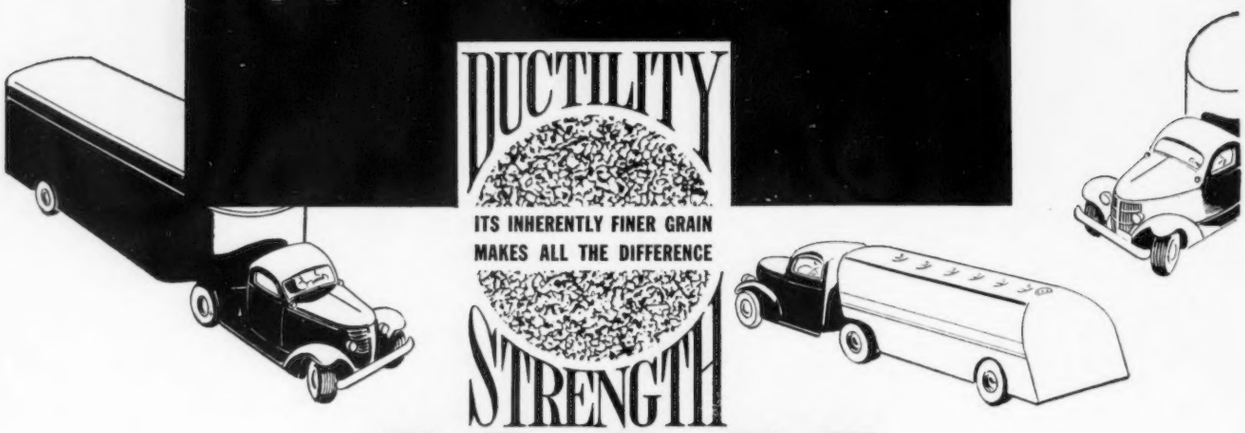
Rod • Strip • Skelp • Merchant Shapes

MORGAN CONSTRUCTION COMPANY, WORCESTER, MASSACHUSETTS

Here's a profit tip

for

equipment designers and builders



Equipment built of **N-A-X**

High Tensile

will last longer . . . cost less to operate . . . stand hard usage . . . earn more money per dollar of investment

The extremely high resistance of N-A-X HIGH TENSILE to sudden blows—shocks—and stresses caused by repeated loading, vibration and reversal of stress—at normal or sub-zero temperatures—makes this really *superior* high tensile steel an important factor in prolonging the life of mobile equipment. Operators find, too, that maintenance cost is greatly reduced. In most cases replacements and repairs, caused from rough roads, hard usage, heavy loadings, have become a thing of the past. Equipment keeps rolling, earning more money per hour of operations.

N-A-X HIGH TENSILE is being used in scores of exacting applications, in many of which ordinary high tensile steels have failed, because it has unusual ductility, high yield point, high ultimate strength, high resistance to corrosion and abrasion and extremely high resistance to impact and fatigue, at normal as well as at sub-zero temperatures.

When you want the most for your high tensile dollar, specify and get N-A-X HIGH TENSILE. It is available in sheets, strip, plates, bars and shapes as well as galvanized products.

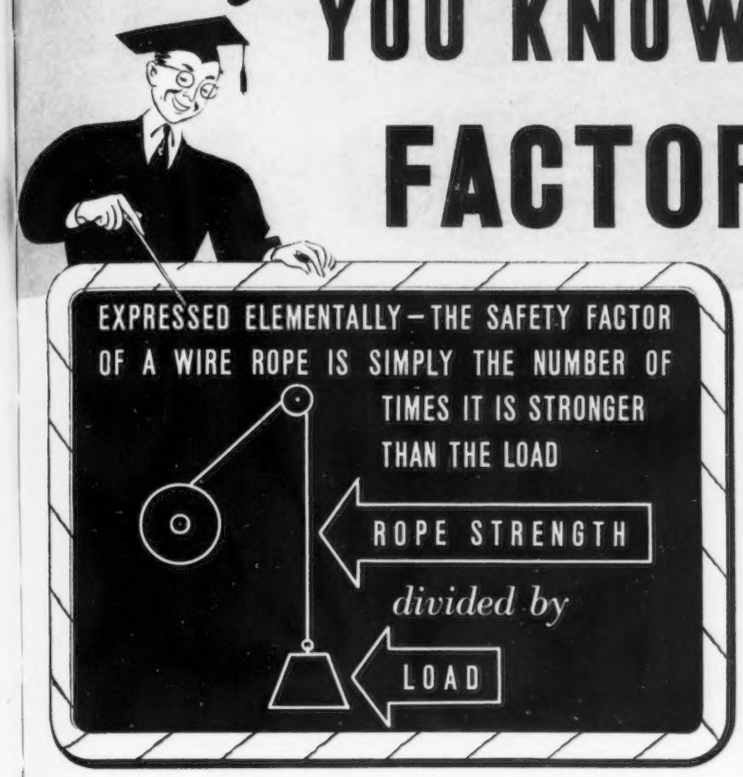
A Great Lakes engineer will be glad to show you how others are using N-A-X HIGH TENSILE to reduce maintenance cost and increase return on equipment investment. Ask for one to call, or write for more detailed information. National Steel Corporation, Detroit, Michigan.

GREAT LAKES STEEL CORPORATION — DETROIT, MICHIGAN

Boston, 1324 Statler Office Building; *Buffalo*, 1000 Walbridge Building; *Chattanooga*, 18 Volunteer Building; *Chicago*, 1026 Builders Building; *Cleveland*, 820 Leader Building; *Dayton*, 1401 Third National Bank Building; *Indianapolis*, 1215-17 Circle Tower; *Minneapolis*, 714 Midland Bank Building; *New York*, 405 Lexington Avenue; *Philadelphia*, 407 Liberty Trust Building; *St. Louis*, 3615 Olive Street; *San Francisco*, 824 Sharon Building; *Toledo*, 906 Edison Building. *Montreal, Quebec*, Drummond, McCall & Co., Limited; *Toronto, Ontario*, Peckover's, Limited.

division of NATIONAL STEEL CORPORATION

Of course YOU KNOW HOW TO FIGURE FACTOR OF SAFETY


EXPRESSED ELEMENTALLY—THE SAFETY FACTOR OF A WIRE ROPE IS SIMPLY THE NUMBER OF TIMES IT IS STRONGER THAN THE LOAD
ROPE STRENGTH
divided by
LOAD

As a user of wire rope, you want to get as much service as possible from your wire rope—and, at the same time, guard against premature failure, accidents, production delays. In other words, you're concerned about wire rope safety factor.

We would like to be able to say, "Just take your dead load and multiply it by such and such a safety factor—and, presto! that's the rope strength you need". But, unfortunately, it's not quite as simple as that.

From our experience of many years in the wire rope business, we know that in order to determine Adequate Safety for a specific wire rope installation, it is necessary to take into consideration not only dead load *but* also all other possible load stresses, such as those created by the factors listed to the right. In addition, allowance must be made for other factors, such as the degree of protection desired against production delays and accidents.

Wire rope specifications, carefully worked out on this basis for individual installations, pay many times over in longer rope life and increased rope safety. We would welcome an opportunity to cooperate with you toward this end.

JOHN A. ROEBLING'S SONS CO.
Trenton, N. J. *Branches in Principal Cities*

This advertisement is published in the interest of all wire rope users, to help them obtain greater safety, service and efficiency from their wire rope.

ROEBLING
Wire Rope

But—

Adequate Safety for a specific installation can be determined only by considering all these Vital Factors:—

- √ ACCELERATION
- √ DECELERATION
- √ LENGTH OF ROPE
- √ SPEED
- √ ATTACHMENTS
- √ REEVING CONDITIONS
- √ DRUM CONDITIONS
- √ CORROSION
- √ ABRASION
- √ PROTECTION AGAINST PRODUCTION DELAYS AND ACCIDENTS
- √√ CONSTRUCTION AND QUALITY OF WIRE ROPE

Therefore **For longer, safer wire rope service consult the nearest Roebling office, giving all pertinent data on your installations.**

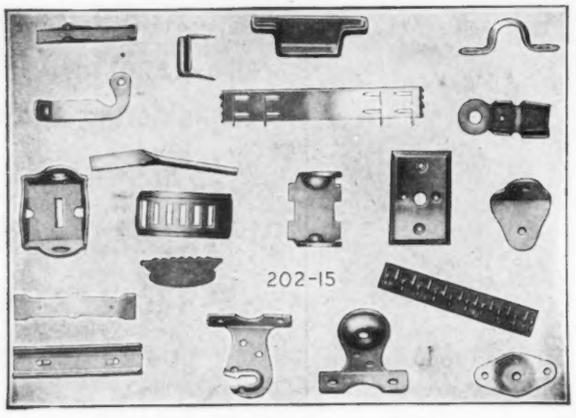
Ask about **ROEBLING "BLUE CENTER" WIRE ROPE** *... either standard or preformed*

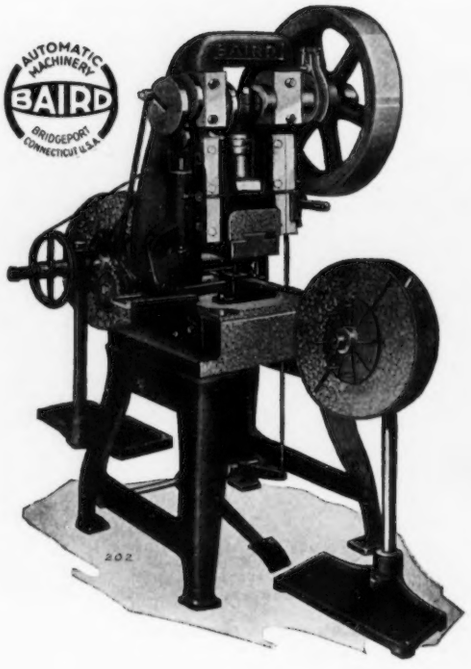
BAIRD AUTOMATIC PRESSES . . .

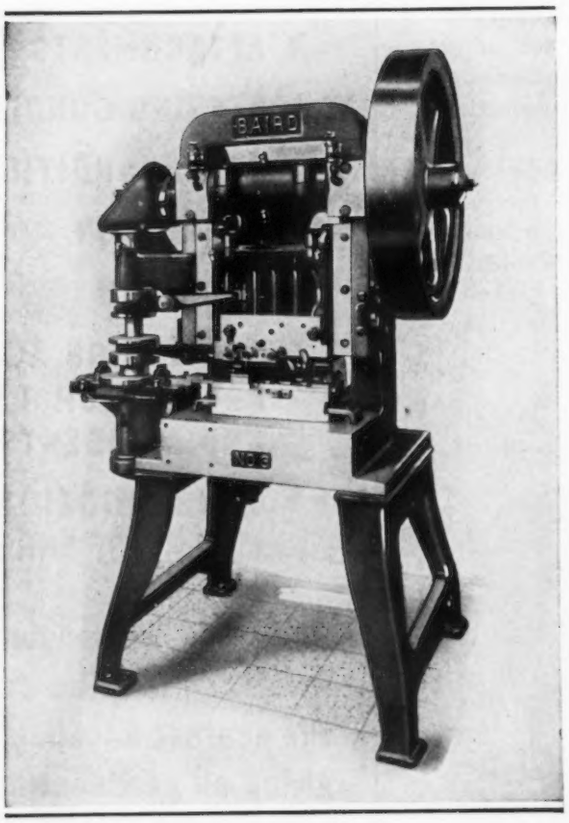
Herewith are shown two types of Baird Automatic Presses for large quantity production. The one to the right is a Standard Heavy Single Action Open Back Press with readily removable and readily attachable automatic attachments, in this instance a single station transfer.

Many manufacturers using automatic machines elsewhere in the shop are overlooking the benefits of the automatic principle in their press departments. For constructive suggestions leading toward betterment of press production we invite such manufacturers to

"Ask BAIRD About It"







AUTOMATIC MULTIPLE TRANSFER PRESSES

The latest of the many Baird achievements is the Automatic Multiple Transfer Press for the automatic production of articles from the coiled material.

Transfer fingers not only transfer the blank to various stations, but they also retain their grip until the punches make contact.

Machines have been arranged with different types of feeding mechanism, strokes for slide, stroke for transfer to best suit the article to be made.

All punches have independent adjustments. The punches, dies, transfer slide and fingers constitute a unit which may be removed from the press *in a very few minutes.* This important feature eliminates time-consuming tool set-ups when changing over from one job to the next.

Over 60 years of Baird engineering skill and experience are embodied in this new Automatic Multiple Transfer Press which is built in six sizes to take strips 1½" to 6" in width. Get the full details of this new development.

"Ask BAIRD About It"

THE BAIRD MACHINE COMPANY
BRIDGEPORT, CONN.

4500 TONS OF STEEL
PUTS THE SPRING IN AMERICA'S STEP

Ever wonder why even your oldest shoes don't get fallen arches, but instead always maintain their springiness? It's because of a little metal shank piece put in the shoe arch as a reinforcement. Here is another example of the importance of steel in your daily life. Each year *4500 tons* of steel go to make these little metal shanks for 250,000,000 pairs of shoes.

The comfort, safety, convenience of almost every moment of our day depends on steel. We enjoy food delicacies from all over the world that could never reach us except for steel cans made of tin plate. Our food is cooked on a steel range, in sanitary enameled steel utensils. We work at steel machines, steel typewriters, or steel desks in buildings made safer by steel framework. We travel by automobile, train, ship or plane made of steel. Our clothing, newspapers, movies are made by steel equipment. And at the end of the day we bathe in a steel tub, and sleep in a bed made comfortable by steel springs.

Youngstown makes the steel for countless of these uses. Every man in our mills knows he is working for your convenience and safety, and is proud of it. *Men* are the most important factors in steel. It is because of our *men* that buyers know they can depend on Youngstown's *steel*.

Sheets - Plates - Pipe and Tubular Products
Conduit - Tin Plate - Bars - Rods - Wire
Nails - Tie Plates and Spikes

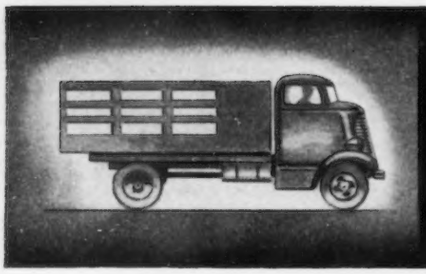
25-21C

QUALITY TRADE MARK YOUNGSTOWN SERVICE

THE YOUNGSTOWN SHEET AND TUBE COMPANY

Manufacturers of Carbon and Alloy Steels

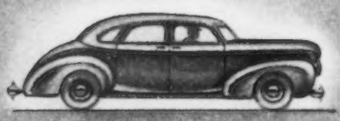
General Offices - YOUNGSTOWN, OHIO

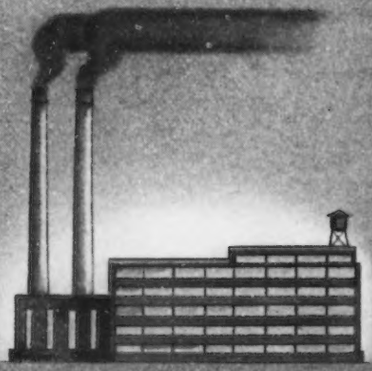


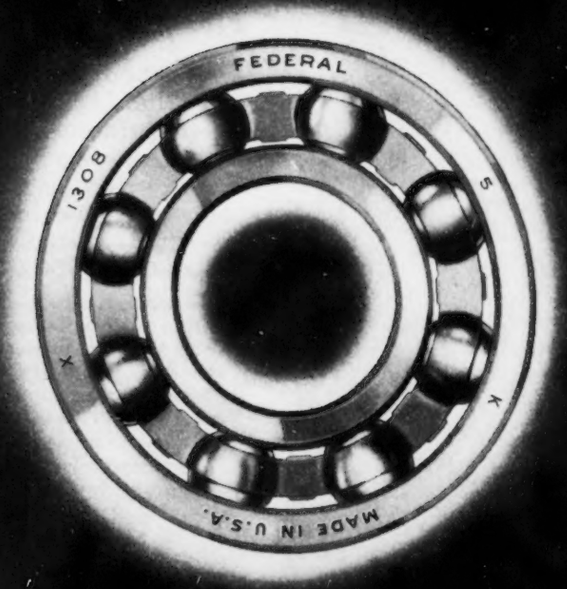
TRADE MARK

FEDERAL

BEARINGS





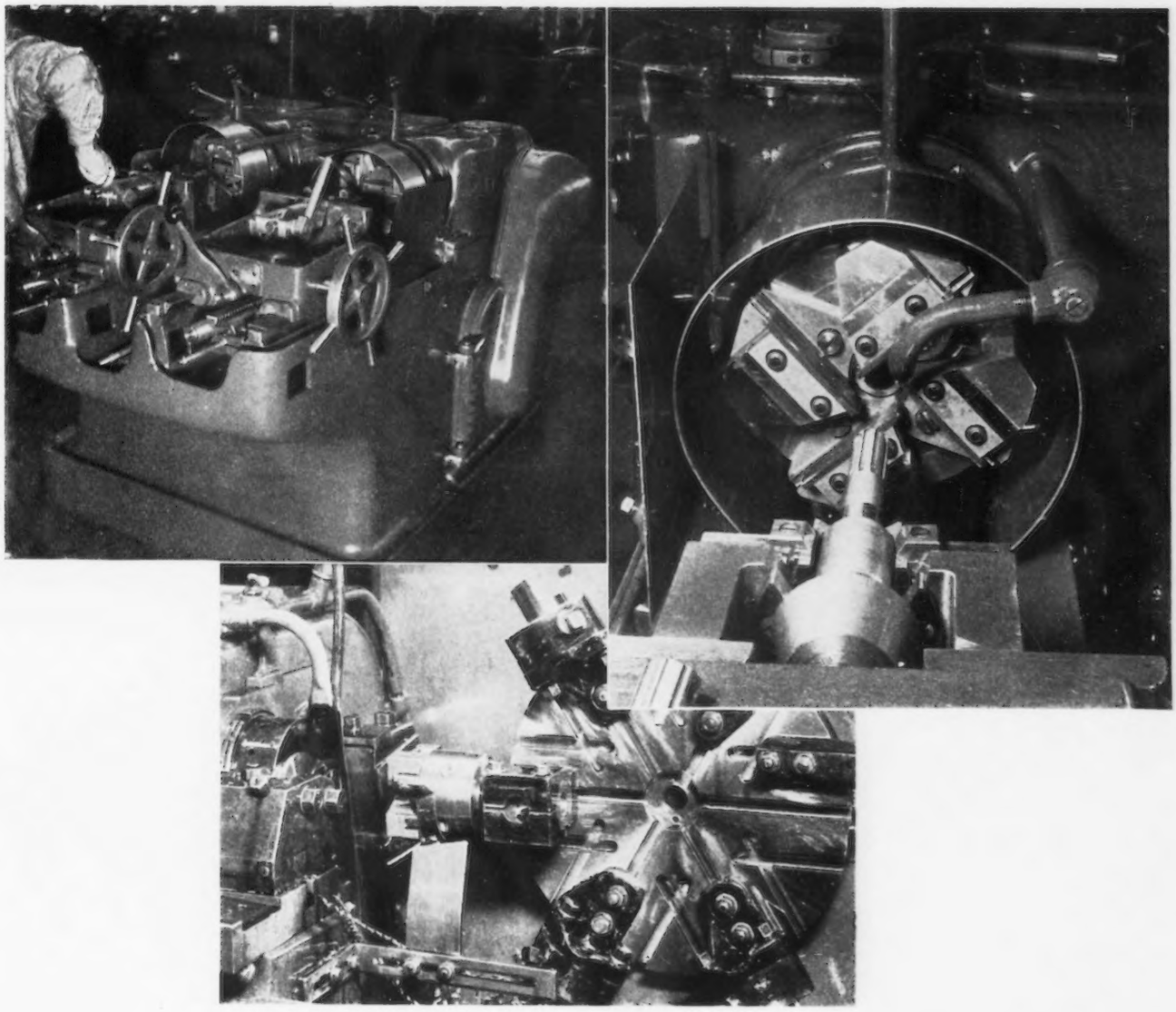


THE FEDERAL BEARINGS CO., INC.

Makers of Fine Ball Bearings

POUGHKEEPSIE, N. Y.

Detroit Sales Office: 2608 Book Tower • Chicago Sales Office: 902 S. Wabash Ave.
Cleveland Sales Office: 402 Swetland Building



PERFORMANCE is the PROOF of MODERNIZATION

The machine tools of a few years ago were not designed and are not capable of producing work of the fine accuracy and at the high productions of present day requirements.

LANDIS Die Heads and Threading Machines are employed in almost every industry for jobbing, maintenance, and production work. While LANDIS Die Heads and Threading Machines have long been recognized for their ability to produce threads of fine accuracy—the complete modernization of the entire LANDIS LINE now makes available to industry—Die Heads and Threading Machines which lead the way to new performance standards.

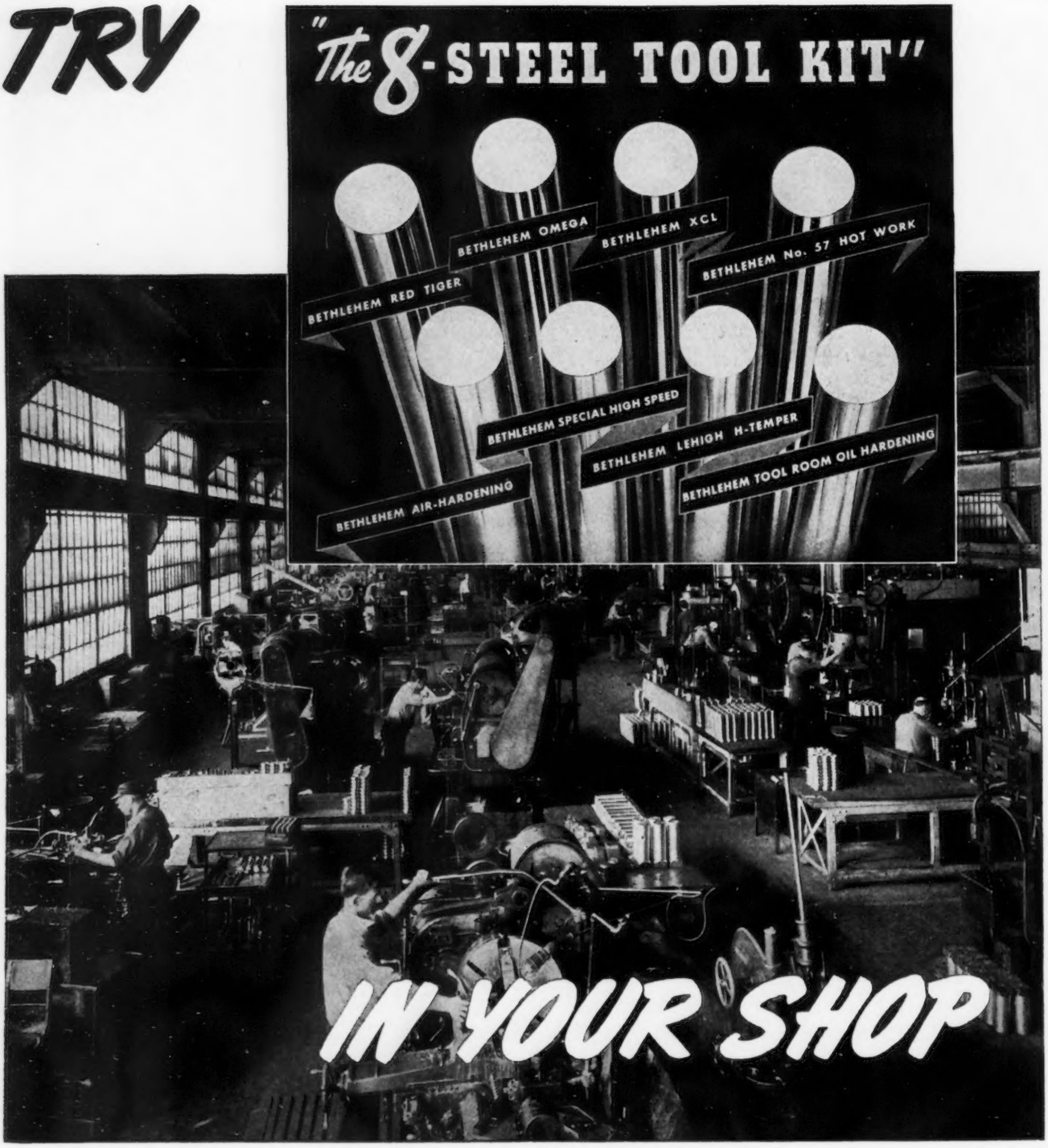
For Complete Modernization in THREADING

LANDISIZE

Investigate the advantages of using modern LANDIS Die Heads and Threading for your thread cutting operations.

LANDIS MACHINE CO., Inc.
WAYNESBORO, PENNA.

TRY



Have you ever considered how handy it would be to have a small compact set of tool steels that would handle virtually every job in the shop?

That's exactly what Bethlehem offers you in the "8-steel tool kit." This set of fine steels is the result of years of developing top-notch tool steels, testing them in the laboratory and in the shop, perfecting them, and then picking the cream of the lot.

Each steel in this set is a veteran performer. Together, the 8 steels are a tested-and-proved combination that will handle 90 per cent of all of the jobs in any shop. Quickly. Cheaply.

Cut inventories. Simplify heat-treatment. Become so familiar with the capabilities of these 8 good steels that you can cut operation costs and improve the quality of your product at the same time.

Write to Bethlehem Steel Company for complete detailed information on the money-saving "8-steel tool kit."

BETHLEHEM STEEL COMPANY

BETHLEHEM STEEL

Advertisement

Stressproof News

T. M. REG. U. S. PAT. OFF. PATENTS PENDING

EXTRA! STRESSPROOF is the trade name for La Salle's new cold finished bar steel possessing unique wearability, high strength, free machinability, and non-warping qualities *right in the bar.* It requires no heat treating or carburizing.

By LA SALLE STEEL COMPANY — **Manufacturers of the Most Complete Line of Cold Finished Steel Bars in America** — **Chicago, Illinois**

Switch to New Bar Steel Saves 59c Per Part; Increases Wearability

A net saving of 59 cents a shaft is reported by a manufacturer of refrigerating equipment as a result of replacing SAE 4615 with STRESSPROOF, La Salle's new "all-purpose" steel bar. The saving was made possible through elimination of case carburizing, straightening and grinding operations and improved machinability. For, as the La Salle representative explained when he recommended STRESSPROOF for this compressor shaft, this new steel possessed *right in the bar as received* satisfactory wearability; high, uniform strength; free machinability; and minimum warpage.

In satisfactory wearing qualities alone, the STRESSPROOF shafts have proved themselves far superior. Not only are they out-wearing the bronze bellows seals (the case carburized hardened and ground SAE 4615 shaft consistently wore out before the seals), but replacement of the seals now takes but 1½ hours each compared to the 6-hour job of renewing shafts.

Anxious to know just how much punishment the STRESSPROOF shaft could take, this manufacturer outlined an accelerated service test of 8,219 hours which the shaft withstood without showing measurable wear, a running time far in excess of the former case carburized shafts.

Interesting corroboration of this manufacturer's experience was lately received from another who ran a STRESSPROOF shaft for 291 days in an accelerated breakdown test without measurable wear.

Farm Machinery Maker Reduces Steel Bar Stocks from 17 Analyses to 7

La Salle Recommendation Simplifies Firm's Buying and Inventory While Reducing Cost of Finished Parts

A prominent manufacturer of farm equipment recently discovered how profitable "re-engineering" of cold finished steel bar specifications can be. In co-operation with a La Salle Steel representative, the engineers of this firm tackled the problem of standardizing their steel bar requirements. The results were extremely satisfactory — the 17 different analyses then carried regularly in stock were reduced to only 7! And substantial savings were reported all down the line. Purchasing was greatly simplified . . . inventories were reduced . . . lower material costs secured because of quantity buying . . . and to top it off, savings in the production cost of many parts resulted, as the 7 analyses selected proved better suited to the purpose than the analyses they replaced.

New Steels Lower Costs

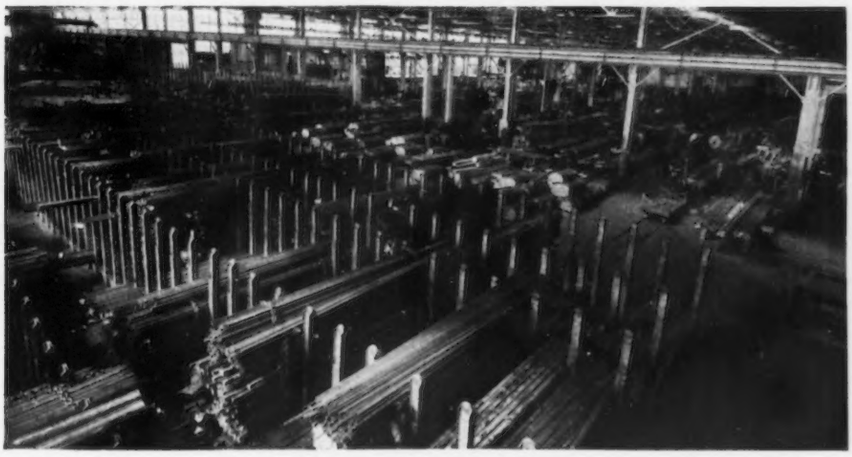
This experience, surprisingly enough not unusual in the steel bar industry, indicates one thing: Maximum production savings are possible only when steel bar specifications are checked periodically and often. Hardly a year passes without the development of some new steel that holds out promise of lowering costs. Yet, as any steel bar expert can testify, the average plant blueprint carries specifications that are 6, 8, 10 and more years old!

An example: In 1926, La Salle developed 1020-90 steel. Not until 9 years later, after 100,000 tons had proved to progressive manufacturers its great superiority, was it given society recognition as SAE X-1020. Naturally, users of SAE steels only, or makers who banked on old specifications, for years passed up the lower machining and carburizing costs of the new, vastly more reliable analysis. Yet EVEN TODAY, many blueprints still call for an antiquated analysis.

What Re-engineering Requires

Re-engineering of blueprints to provide the benefits of modern methods and materials requires two things: (1) the assistance of a qualified, experienced representative who knows the production problems of the steel bar user well enough to recommend the right material for every application. (2) a producer able to supply the right material.

On its ability to meet both requirements — to help re-engineer specifications for lower cost and better quality — as demonstrated by its growth to "manufacturer of the most complete line of cold finished steel bars in America"-- La Salle invites inquiries from steel bar users.



The heart of the La Salle Mill

La Salle STEEL COMPANY

Manufacturers of Cold Drawn Shafting
Ground Shafting
Turned and Polished Shafting
Bessemer Screw Steels
Open Hearth Carburizing Steels
Alloy Carburizing Steel
Open Hearth Heat Treating Steels
Alloy Heat Treating Steels
STRESSPROOF STEELS
Furnace Treated Hot Rolled Steels
Special Sections

Address: Dept. 9-G, Box 6800-A
CHICAGO, ILL.

Products Index

WHO MAKES IT

Here you find a weekly listing of hundreds of products with the names and addresses of manufacturers. The advertisements of these companies appear in The Iron Age.

ABRASIVE CLOTH & PAPER
Carborundum Co., The Niagara Falls, N. Y.
Norton Co., Worcester, Mass.

ABRASIVE GRAIN
Carborundum Co., The Niagara Falls, N. Y.

ABRASIVE WHEELS — See Grinding Wheels

ABRASIVES—Steel Shot and Grit
American Foundry Equipment Co., The, 510 S. Byrkit St., Mishawaka, Ind.
Harrison Abrasive Corp., Manchester, N. H.
Pangborn Corporation, Hagerstown, Md.
Pittsburgh (Pa.) Crushed Steel Co.
Steel Shot & Grit Co., Boston, Mass.

ACCESSORIES—Welding
Lincoln Electric Co., The, Cleveland.

ACCUMULATORS—Hydraulic
Baldwin-Southwark Div. Baldwin Locomotive Wks., Philadelphia.
Wood, R. D., & Co., Philadelphia, Pa.

ACETYLENE—Dissolved in Cylinders & Small Tanks
Air Reduction, 60 East 42nd St., N.Y.C.
Linde Air Products Company, The, 30 East 42nd St., N. Y. C.

ACID-PROOF CEMENT
Pennsylvania Salt Mfg. Co., Philadelphia, Pa.

ACIDS—Pickling
American Chemical Paint Co., Ambler, Pa.
Pennsylvania Salt Mfg. Co., Philadelphia, Pa.

AIR CONDITIONING EQUIPMENT
American Blower Corp., 6000 Russell St., Detroit, Mich.

ALLOYS—Copper
American Brass Co., The, Waterbury, Conn.
Mallory, P. R., & Co., Inc., Indianapolis, Ind.

ALLOYS—Corrosion & Abrasion Resistant
Wall-Colmonoy Corp., Detroit, Mich.

ALLOYS—Ferro
Electro Metallurgical Sales Corp., 30 East 42nd St., N. Y. C.

ALLOYS—Magnesium
American Magnesium Corp., 1701 Gulf Bldg., Pittsburgh.
Dow Chemical Co., The, 921 Jefferson Ave., Midland, Mich.

ALLOYS—Tungsten
Vanadium Corp. of America, 420 Lexington Ave., N.Y.C.

ALLOYS—Vanadium
Vanadium Corp. of America, 420 Lexington Ave., N.Y.C.

ALLOYS—Zinc For Die Castings
New Jersey Zinc Co., The, 160 Front St., N. Y. C.

ALUMINUM
Aluminum Co. of America, Pittsburgh.

AMMETERS & VOLTMETERS
General Electric Co., Schenectady, N. Y.

AMMETERS AND VOLTMETERS—Recording
Leeds & Northrup Co., 4956 Stenton Ave., Philadelphia.

AMMONIA RECOVERY PLANTS
Koppers Co., Engineering & Construction Div., Pittsburgh.

ANGLES, BEAMS, CHANNELS AND TEES
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Columbia Steel Co. (U. S. Steel Corp. Subsidiary), San Francisco, Calif.
Inland Steel Co., Chicago.
Jones & Laughlin Steel Corp., Pittsburgh.
Ryerson, Jos. T., & Son, Inc., Chicago.
Scully Steel Products Co. (U. S. Steel Corp. Subsidiary), Chicago
Steel & Tubes Div. of Republic Steel Corp., Cleveland.
Tennessee Coal, Iron & Railroad Co. (U. S. Steel Corp. Subsidiary), Birmingham, Ala.

ANGLES, BEAMS, CHANNELS & TEES—Magnesium Alloys
Dow Chemical Co., The 921 Jefferson Ave., Midland, Mich.

ANNEALING—See Heat Treating

ANNEALING BOXES
Lebanon (Pa.) Steel Foundry.
United Engineering & Fdry. Co., Pgh.

ANODES—Lead
National Lead Co., 111 Bdway., N. Y. C.

APPAREL—Welding
Lincoln Electric Co., The, Cleveland.

ARBORS
Cincinnati (Ohio) Milling Mch. Co., The.
Morse Twist Drill & Mch. Co., New Bedford, Mass.

ARRESTERS—Spark
Harrington & King Perforating Co., The, Chicago.

ASBESTOS
Carey, Philip, Co., The, Cincinnati, Ohio.
Johns-Manville Corp., 22 East 40th St., N. Y. C.

AXLES—Car or Locomotive
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.

AXLES—Upset Forged
American Forge Div. The American Brake Shoe & Foundry Co., 2621 So. Hoyne Ave., Chicago, Ill.

BABBITT METALS
Bunting Brass & Bronze Co., The, Toledo, Ohio.
Cadman, A. W., Mfg. Co., Pittsburgh.
Cramp Brass & Iron Foundries Co., Philadelphia.
National Lead Co., 111 Bdway., N. Y. C.

BALANCING MACHINES — Static Dynamic
Gisholt Machine Co., Madison, Wis.

BALING PRESSES—Scrap — See Presses—Baling

BALLS—Burnishing
Abbott Ball Co., The, 1047 New Britain Ave., Hartford, Conn.
Hartford (Conn.) Steel Ball Co., The.

BALLS—Steel, Brass or Bronze
Abbott Ball Co., The, 1047 New Britain Ave., Hartford, Conn.
Fafnir Bearing Co., The, New Britain, Conn.
Hartford (Conn.) Steel Ball Co., The.
New Departure Div., General Motors Sales Corp., Bristol, Conn.
SKF Industries, Inc., Front St. & Erie Ave., Phila., Pa.

BANDS—Steel
Tennessee Coal, Iron & Railroad Co. (U. S. Steel Corp. Subsidiary), Birmingham, Ala.

BARRELS—Burnishing
Abbott Ball Co., The, 1047 New Britain Ave., Hartford, Conn.

BARRELS—Tumbling
Baird Mch. Co., The, Bridgeport, Conn.
Hartford (Conn.) Steel Ball Co., The.
Whiting Corp., Harvey, Ill.

BARS—Alloy
Copperweld Steel Co., Warren, Ohio.
Midvale Co., The, Nicetown, Phila., Pa.
Republic Steel Corp., Cleveland, Ohio.

BARS—Aluminum
Aluminum Co. of America, Pittsburgh.

BARS—Brass, Bronze or Copper
Bunting Brass & Bronze Co., Toledo, Ohio.
Johnson Bronze Co., 505 So. Mill St., New Castle, Pa.

BARS—Cold Drawn
American Steel & Wire Co. (U. S. Steel Corp. Subsidiary), Cleveland.
Bliss & Laughlin, Inc., Harvey, Ill.; Buffalo, N. Y.
Jones & Laughlin Steel Corp., Pittsburgh.
Monarch Steel Co., Indianapolis, Ind.
Union Drawn Steel Div. Republic Steel Corp., Massillon, Ohio.

BARS—Concrete, Reinforcing
Bethlehem (Pa.) Steel Company.
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Columbia Steel Co. (U. S. Steel Corp. Subsidiary), San Francisco, Calif.
Jones & Laughlin Steel Corp., Pittsburgh.
Laclede Steel Co., St. Louis, Mo.
Nicetown Plate Washer Co., Inc., Philadelphia.
Tennessee Coal, Iron & Railroad Co. (U. S. Steel Corp. Subsidiary), Birmingham, Ala.

BARS—Magnesium Alloys
American Magnesium Corp., 1701 Gulf Bldg., Pittsburgh.
Dow Chemical Co., The, 921 Jefferson Ave., Midland, Mich.

BARS—Rustless
Midvale Co., The, Nicetown, Phila., Pa.
Rustless Iron & Steel Corp., Baltimore, Md.

BARS—Steel
Bethlehem (Pa.) Steel Company.
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Copperweld Steel Co., Warren, Ohio.
Great Lakes Steel Corp., Ecorse, Detroit
Inland Steel Co., Chicago.
Jones & Laughlin Steel Corp., Pittsburgh.
LaSalle Steel Co., Chicago.
Monarch Steel Co., Indianapolis, Ind.
Republic Steel Corp., Cleveland, Ohio.
Ryerson, Jos. T., & Son, Inc., Chicago.
Scully Steel Products Co. (U. S. Steel Corp. Subsidiary), Chicago.
Steel & Tubes Div. of Republic Steel Corp., Cleveland.
Tennessee Coal, Iron & Railroad Co. (U. S. Steel Corp. Subsidiary), Birmingham, Ala.
Timken Roller Bearing Co., The, Canton, O.
Timken Steel & Tube Div., The Timken Roller Bearing Co., Canton, O.
Wisconsin Steel Co., Chicago, Ill.
Youngstown (Ohio) Sheet & Tube Co., The.

BATTERIES—Storage
Electric Storage Battery Co., The, Phila.
Philco, Battery Div., Phila., Pa.

BATTERY CHARGERS
Cutler-Hammer, Inc., Milwaukee.

BEAMS—See Angles, Beams, Channels and Tees

BEARINGS—Babbitt
Bunting Brass & Bronze Co., The, Toledo, Ohio.
Cadman, A. W., Mfg. Co., Pittsburgh.
Johnson Bronze Co., 505 So. Mill St., New Castle, Pa.

BEARINGS—Ball
Bantam Bearings Corp., The, South Bend, Ind.
Bearings Co. of America, Lancaster, Pa.
Fafnir Bearing Co., The, New Britain, Conn.
Federal Bearings Co., Inc., The, Poughkeepsie, N. Y.
New Departure Div., General Motors Sales Corp., Bristol, Conn.
SKF Industries, Inc., Front St. & Erie Ave., Phila., Pa.
Schatz Mfg. Co., Poughkeepsie, N. Y.

BEARINGS, Brass and Bronze
Ampco Metal, Inc., Milwaukee, Wis.
Bunting Brass & Bronze Co., Toledo, O.
Johnson Bronze Co., 505 So. Mill St., New Castle, Pa.
National Bearing Metals Corp., Pittsburgh.
Shenango-Penn Mold Co., Dover, Ohio.

BEARINGS—Oilless
Bunting Brass & Bronze Co., Toledo, O.
Rhoades, R. W., Metaline Co., Inc., Long Island City, N. Y.

BEARINGS—Quill
Bantam Bearings Corp., The, South Bend, Ind.

BEARINGS—Radial
Bantam Bearings Corp., The, South Bend, Ind.
Bower Roller Bearing Co., Detroit, Mich.
Fafnir Bearing Co., The, New Britain, Conn.
Federal Bearings Co., Inc., The, Poughkeepsie, N. Y.
Hyatt Bearings Div. General Motors Sales Corp., Harrison, N. J.
New Departure Div., General Motors Sales Corp., Bristol, Conn.
SKF Industries, Inc., Front St. & Erie Ave., Phila., Pa.
Schatz Mfg. Co., The, Poughkeepsie, N. Y.

BEARINGS—Roll Neck
Bantam Bearings Corp., The, South Bend, Ind.
Morgan Construction Co., Worcester, Mass.
SKF Industries, Inc., Front St. & Erie Ave., Phila., Pa.
Timken Roller Bearing Co., The, Canton, O.

BEARINGS—Roller
Bantam Bearings Corp., The, South Bend, Ind.
Bower Roller Bearing Co., Detroit, Mich.
Hyatt Bearings Div. General Motors Sales Corp., Harrison, N. J.
Link-Belt Co., 519 North Holmes Ave. Indianapolis, Ind.
SKF Industries, Inc., Front St. & Erie Ave., Phila., Pa.
Timken Roller Bearing Co., The, Canton, O.

BEARINGS—Roller Tapered
Bantam Bearings Corp., The, South Bend, Ind.
Bower Roller Bearing Co., Detroit, Mich.
Timken Roller Bearing Co., The, Canton, O.

BEARINGS—Rolling Mill Equipment
Bantam Bearings Corp., The, South Bend, Ind.
Morgan Construction Co., Worcester, Mass.
SKF Industries, Inc., Front St. & Erie Ave., Phila., Pa.
Timken Roller Bearing Co., The, Canton, O.

BEARINGS—Shaft Hanger
Fafnir Bearing Co., The, New Britain, Conn.
Hyatt Bearings Div. General Motors Sales Corp., Harrison, N. J.
SKF Industries, Inc., Front St. & Erie Ave., Phila., Pa.

BEARINGS—Thrust
Bantam Bearings Corp., The, South Bend, Ind.
Bearings Co. of America, Lancaster, Pa.
Fafnir Bearing Co., The, New Britain, Conn.
Federal Bearings Co., Inc., The, Poughkeepsie, N. Y.
Hyatt Bearings Div. General Motors Sales Corp., Harrison, N. J.
New Departure Div., General Motors Sales Corp., Bristol, Conn.
SKF Industries, Inc., Front St. & Erie Ave., Phila., Pa.
Schatz Mfg. Co., The, Poughkeepsie, N. Y.
Timken Roller Bearing Co., The, Canton, O.

BELT—Conveyor, Elevator
Hewitt Rubber Corp., Buffalo, N. Y.
Manhattan Rubber Mfg. Div. of Raybestos-Manhattan Inc., The, 2 Townsend St., Passaic, N. J.

BELTING—Leather
Chicago (Ill.) Rawhide Mfg. Co., The, 1306 Elston Ave.

BELTING—Metal, Conveyor, High and Low Temperature
Wickwire Spencer Steel Co., 500 Fifth Ave., N. Y. C.

BELTING—Rubber
Hewitt Rubber Corp., Buffalo, N. Y.
Manhattan Rubber Mfg. Div. of Raybestos-Manhattan Inc., The, 2 Townsend St., Passaic, N. J.

BELTS—V-Type
Allis-Chalmers Mfg. Co., Milwaukee.
Manhattan Rubber Mfg. Div. of Raybestos-Manhattan Inc., The, 2 Townsend St., Passaic, N. J.

BENCH LEGS—Steel
New Britain-Gridley Machine Div., The New Britain Machine Co., New Britain, Conn.

BENCH PLATES
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Swan Engineering Co., Inc., Newark, N. J.

BENDING MACHINES—Hand, Band and Angle
Excelsior Tool & Mch. Co., E. St. Louis, Ill.

BENDING MACHINES—Hand and Power
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Cincinnati (Ohio) Shaper Co., The.
Cleveland Crane & Engineering Co. The, Steelweld Mchry. Div., Wickliffe, Ohio.
Cleveland (Ohio) Punch & Shear Works Co., The.
Niagara Machine & Tool Works, Buffalo, N. Y.

BENZOL RECOVERY PLANTS
Koppers Co., Engineering & Construction Div., Pittsburgh.

BERYLLIUM COPPER
American Brass Co., The, Waterbury, Conn.

BILLETS—Alloy
Harrisburg (Pa.) Steel Corp.
Midvale Co., The, Nicetown, Phila., Pa.

BILLETS—Alloy Steel
Andrews Steel Co., The, Newport, Ky.
Copperweld Steel Co., Warren, Ohio.

BILLETS—Carbon
Harrisburg (Pa.) Steel Corp.

BILLETS—Carbon Steel
Andrews Steel Co., The, Newport, Ky.

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FOR DRAWING AND FORMING DIES

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The Iron Age has experienced a marked gain in circulation this year. Thousands of new subscribers. They have indicated their interest in The Iron Age by paying six dollars for each subscription.

Most of these new subscribers are metal-working companies in the United States. Quite a number are metal-working companies in Canada—a market of increasing importance to American manufacturers.

While increases in The Iron Age's circulation in the United States and Canada have been occurring—foreign circulation has declined due to the chaotic conditions overseas. Thus buying-power is on the move, and the circulation of The Iron Age—responsive because it's *paid circulation*—moves with it. Advertisers in The Iron Age can depend upon coverage of active industrial markets.

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BILLETS—Chrome Nickel Steel
Rustless Iron & Steel Corp., Baltimore, Md.

BILLETS—Chrome Steel
Rustless Iron & Steel Corp., Baltimore, Md.

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Andrews Steel Co., The, Newport, Ky.
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BLANKS—Chisel
Cleveland (Ohio) Punch & Shear Works Co., The.
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BLANKS—Gear and Pinion
Chicago (Ill.) Rawhide Mfg. Co., The, 1306 Elston Ave.

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BLAST CLEANING EQUIPMENT
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BLAST FURNACE PLANTS—Complete
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Progressive Mfg. Co., Torrington, Conn.
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Carboloy Co., Inc., 11153 East 8-Mile Road, Detroit, Michigan.
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BORING, DRILLING & MILLING MACHINES—Horizontal
Giddings & Lewis Machine Tool Co., Fond Du Lac, Wisc.
Hill-Clarke Mchry. Co., 647 W. Washington Blvd., Chicago.
Lucas Machine Tool Co., Cleveland.
Ohio Machine Tool Co., Kenton, Ohio.
Sellers, William, & Co., Inc., 1620 Hamilton St., Philadelphia, Pa.

BORING & DRILLING MACHINES—Vertical
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Consolidated Machine Tool Corp., Rochester, N. Y.

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Pratt & Whitney Div. Niles-Bement-Pond Co., West Hartford, Conn.

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BRAKES—Magnetic
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Schatz Mfg. Co., The, Poughkeepsie, N. Y.

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BRIDGE BUILDERS
American Bridge Co. (U. S. Steel Corp. Subsidiary), Pittsburgh.
Belmont Iron Works, Philadelphia.

BRIDGE OPERATING MACHINERY—Movable
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BRIQUETS—Ferroalloy
Electro Metallurgical Sales Corp., 30 East 42nd St., N. Y. C.

BROACHES
Colonial Broach Co., Detroit.
Ex-Cell-O Corp., 1210 Oakman Blvd., Detroit, Mich.
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Colonial Broach Co., Detroit.
Lucas Machine Tool Co., Cleveland.
Oilgear Co., The, 1311 W. Bruce St., Milwaukee.

BRONZE FOR DIES
Ampco Metal, Inc., Milwaukee, Wis.

BRONZE—Phosphor
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Revere Copper & Brass, Inc., 230 Park Ave., New York City.

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BUCKETS—Orange Peel
Hayward Co., The, 50 Church St.,N. Y. C.

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Cimatool Co., The, Dayton, Ohio.

BURRING MACHINES
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National Broach & Machine Co., Detroit, Mich.

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Bunting Brass & Bronze Co., Toledo, O.
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Shenango-Penn Mold Co., Dover, Ohio.

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BUSHINGS—Oilless
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Koppers Co., Engineering & Construction Div., Pittsburgh.

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General Electric Co., Schenectady, N. Y
Lincoln Electric Co., The, Cleveland.

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CALCIUM METAL & ALLOYS
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CARBIDE
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Linde Air Products Company, The, 30 East 42nd St., N. Y. C.

CARBIDE—Boron
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CARBIDES—Cemented
Carboloy Co., Inc., 11153 East 8-Mile Road, Detroit, Michigan.

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CARS—Railway
Iron & Steel Products, Inc., Chicago.

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Hoskins Mfg. Co., Detroit, Mich.
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Bunting Brass & Bronze Co., The, Toledo, Ohio.
Cadman, A. W., Mfg. Co., Pittsburgh.
Cramp Brass & Iron Foundries Co., Philadelphia.
Ellison Bronze Co., Inc., Jamestown, New York.
National Bearing Metals Corp., Pittsburgh.
Shenango-Penn Mold Co., Dover, Ohio.
Spencer's, I. S., Sons, Inc., Guilford, Ct.

CASTINGS—Bronze
Koppers Co., Bartlett Hayward Div., Baltimore, Md.

CASTINGS—Corrosion Resisting
Allegheny Ludlum Steel Corp., Pittsburgh, Pa.
Cramp Brass & Iron Foundries Co., Philadelphia.
Meehanite Research Institute, Pittsburgh, Pa.
Midvale Co., The, Nicetown, Phila., Pa.
Ohio Steel Foundry Co., Lima, Ohio.
Wall-Colmonoy Corp., Detroit, Mich.

CASTINGS—Die
Titan Metal Mfg. Co., Bellefonte, Pa.

CASTINGS—Die, Aluminum
Aluminum Co. of America, Pittsburgh.

CASTINGS—Electric Steel
Crucible Steel Castings Co., Lansdowne, Pa.
Lebanon (Pa.) Steel Foundry.
National-Erie Corp., Erie, Pa.
Ohio Steel Foundry Co., Lima, Ohio.

CASTINGS—Gray Iron
Advance Foundry Co., The, Dayton, Ohio
American Engineering Co., Philadelphia
Cramp Brass & Iron Foundries Co., Philadelphia.
Diamond Iron Works, Inc., Minneapolis, Minn.
Kline Hardware Co., Allentown, Pa.
Koppers Co., Bartlett Hayward Div., Baltimore, Md.
Lobdell Car Wheel Co., Nazel Hammer Div., Wilmington, Del.
National Roll & Fdry. Co., Avonmore, Pa.
North Wales (Pa.) Mach. Co., Inc.
Ramsey Chain Co., Inc., Albany, N. Y.
Spencer's, I. S., Sons, Inc., Guilford, Ct
Sprout, Waldron & Co., 1400 Sherman St., Muncy, Pa.
Vilter Mfg. Co., The, 2140 So. First St., Milwaukee, Wis.

CASTINGS—High Test & Alloy Iron
Cramp Brass & Iron Foundries Co., Philadelphia.
Meehanite Research Institute, Pittsburgh, Pa.

CASTINGS—Magnesium Alloys
American Magnesium Corp., 1701 Gulf Bldg., Pittsburgh.
Dow Chemical Co., The, 921 Jefferson Ave., Midland, Mich.

CASTINGS—Malleable
Lake City Malleable Co., The, 5100 Lakeside Ave., Cleveland.
Peoria (Ill.) Malleable Castings Co.

CASTINGS—Meehanite Metal
Meehanite Research Institute, Pittsburgh, Pa.

CASTINGS—Monel & Nickel
Cramp Brass & Iron Foundries Co., Philadelphia.

CASTINGS—Semi-Steel
Cramp Brass & Iron Foundries Co., Philadelphia.

CASTINGS—Steel
Allegheny Ludlum Steel Corp., Pittsburgh, Pa.
American Rolling Mill Co., The, Middletown, Ohio.
Bethlehem (Pa.) Steel Company.
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Columbia Steel Co. (U. S. Steel Corp. Subsidiary), San Francisco, Calif.
Crucible Steel Castings Co., Lansdowne, Pa.
Hartford (Conn.) Electric Steel Corp.
Lebanon (Pa.) Steel Foundry.
Mackintosh-Hemphill Co., Pittsburgh
Mesta Mch. Co., Pittsburgh.
National-Erie Corp., Erie, Pa.
Ohio Steel Foundry Co., Lima, Ohio.
Standard Steel Wks. Div. The Baldwin Locomotive Works, Phila., Pa.
Strong Steel Foundry Co., Buffalo, N. Y.

CASTINGS—Wear Resisting
Meehanite Research Institute, Pittsburgh, Pa.
Wall-Colmonoy Corp., Detroit, Mich.

CEMENT—Acid-Proof
Pennsylvania Salt Mfg. Co., Philadelphia, Pa.

CEMENT—Refractory
Babcock & Wilcox Co., The, 85 Liberty St., New York City.
Carborundum Co., The, Perth Amboy, N. J.
Johns-Manville Corp., 22 East 40th St., New York City.

CENTER LAPPING MACHINES
Ex-Cell-O Corp., 1210 Oakman Blvd., Detroit, Mich.

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CENTERING MACHINES
Jones & Lamson Machine Co., Springfield, Vt.

CERAMIC SUPPLIES
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CHAINS—Conveyor & Elevator
Heyl & Patterson, Inc., Pittsburgh.
Link-Belt Co., 300 West Pershing Road, Chicago, Ill.

CHAINS—Power Transmission
Link-Belt Co., 519 North Holmes Ave., Indianapolis, Ind.
Morse Chain Co., Ithaca, N. Y.
Ramsey Chain Co., Inc., Albany, N. Y.
Whitney Chain & Mfg. Co., Hartford, Ct.

CHAINS—Roller
Link-Belt Co., 519 North Holmes Ave., Indianapolis, Ind.
Morse Chain Co., Ithaca, N. Y.
Whitney Chain & Mfg. Co., Hartford, Ct.

CHAINS—Silent
Link-Belt Co., 519 North Holmes Ave., Indianapolis, Ind.
Morse Chain Co., Ithaca, N. Y.
Whitney Chain & Mfg. Co., Hartford, Ct.

CHAMFERING MACHINES (Gear)
Cimatool Co., The, Dayton, Ohio.

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Cunningham, M. E., Co., Pittsburgh, Pa.

CHEMICALS—Industrial
Pennsylvania Salt Mfg. Co., Philadelphia, Pa.

CHEMICALS—Rust Proofing
Parker Rust Proof Co., 2186 Milwaukee Ave., Detroit.

CHROMIUM METAL & ALLOYS
Electro Metallurgical Sales Corp., 30 East 42nd St., N. Y. C.

CHROMIUM — Plating — See Plating — Chromium

CHUCKING MACHINES—Automatic
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CHUCKING MACHINES—Multiple Spindle
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Goss & DeLeeuw Machine Co., New Britain, Conn.
National Acme Co., The, Cleveland.
Potter & Johnston Machine Co., Pawtucket, R. I.

CHUCKS—Drill
Cleveland (Ohio) Twist Drill Co., The.
Cushman Chuck Co., Hartford, Conn.
Millers Falls Co., Greenfield, Mass.
Morse Twist Drill & Mach. Co., New Bedford, Mass.

CHUCKS—Electric
Cushman Chuck Co., Hartford, Conn.

CHUCKS—Lathe
Cushman Chuck Co., Hartford, Conn.

CHUCKS—Magnetic
Brown & Sharpe Mfg. Co., Providence, R. I.
Heald Machine Co., Worcester, Mass.
Taft-Peirce Mfg. Co., The, Woonsocket, R. I.

CIRCLES—Phosphor Bronze
Revere Copper & Brass, Inc., 230 Park Ave., New York City.

CLEANERS—Metal
American Chemical Paint Co., Ambler, Pa.
Detroit Rex Products Co., Detroit, Mich.
Ford, J. B., Sales Co., The, Wyandotte, Mich.
Pennsylvania Salt Mfg. Co., Philadelphia, Pa.

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CLEANING EQUIPMENT—Metal
Detroit Rex Products Co., Detroit, Mich.

CLOTHING—Asbestos & Fireproof
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Stearns Magnetic Mfg. Co., 635 So. 28th St., Milwaukee.

CLUTCHES
Fairbanks, Morse & Co., Chicago.
Falls Clutch & Mchry. Co., The, Cuyahoga Falls, Ohio.
Hilliard Corp., The, Railroad Ave., Elmira, N. Y.
Morse Chain Co., Ithaca, N. Y.

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Twin Disc Clutch Co., Racine, Wis.

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Cutler-Hammer, Inc., Milwaukee.
Dings Magnetic Separator Co., 727 Smith St., Milwaukee.
Stearns Magnetic Mfg. Co., 635 So. 28th St., Milwaukee.

CLUTCHES—Overrunning
Hilliard Corp., The, Railroad Ave., Elmira, N. Y.

CLUTCHES—Tractor
Twin Disc Clutch Co., Racine, Wis.

COAL
Cleveland-Cliffs Iron Co., The, Cleveland, Ohio.
Koppers Coal Co., The, Pittsburgh.
Pickands Mather & Co., Cleveland.

COAL, ORE & ASH HANDLING MACHINERY
Heyl & Patterson, Inc., Pittsburgh.
Link-Belt Co., 300 West Pershing Road, Chicago, Ill.

COBALT METAL
Central Trading Corp., 511 Fifth Ave., N. Y. C.

COILS—Lead
National Lead Co., 111 Bdway., N. Y. C.

COILS—Pipe
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COILS—Tubing & Pipe
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COLUMBIUM
Electro Metallurgical Sales Corp., 30 E. 42nd St., N. Y. C.

COMBUSTION CONTROLS
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Leeds & Northrup Co., 4956 Stenton Ave., Philadelphia.
Morgan Construction Co., Worcester, Mass.

COMPOUNDS—Drawing and Cutting
Gulf Oil Corp., Gulf Refining Co., Pittsburgh.
Penola, Inc., Pittsburgh, Pa.
Standard Oil Co. (Indiana), Chicago.
Tide Water Associated Oil Co., 17 Battery Place, N. Y. C.

COMPOUNDS—Lapping
Carborundum Co., The Niagara Falls, N. Y.
National Broach & Machine Co., Detroit, Mich.

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Fairbanks, Morse & Co., Chicago.
Westinghouse Air Brake Co., Industrial Div., Pittsburgh.

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Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

CONTACTS—Electrical
Mallory, P. R., & Co., Inc., Indianapolis, Ind.

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McKee, Arthur G., & Co., Cleveland, Ohio.
Pennsylvania Engineering Works, New Castle, Pa.

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Leeds & Northrup Co., 4956 Stenton Ave., Philadelphia.

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Clark Controller Co., The, Cleveland.
Cutler-Hammer, Inc., Milwaukee.
Electric Controller & Mfg. Co., The, Cleveland.

CONTROLLERS—Electric
Clark Controller Co., The, Cleveland.
Cutler-Hammer, Inc., Milwaukee.
Electric Controller & Mfg. Co., The, Cleveland.
General Electric Co., Schenectady, N. Y.

CONTROLLERS—Valve, Electrically Operated
Brown Instrument Co., The, Philadelphia, Pa.
Cutler-Hammer, Inc., Milwaukee.
Leeds & Northrup Co., 4956 Stenton Ave., Philadelphia.

CONTROLS—Time Cycle
Koppers Co., Bartlett Hayward Div., Baltimore, Md.

CONVEYING AND ELEVATING MACHINERY
Heyl & Patterson, Inc., Pittsburgh.
Link-Belt Co., 300 West Pershing Road, Chicago, Ill.
Logan Co., Inc., Louisville, Ky.
Mathews Conveyer Co., Ellwood City, Pa.

CONVEYOR WORMS
Lee Spring Co., Inc., 30 Main St., Brooklyn, N. Y.

CONVEYORS—Gravity
Logan Co., Inc., Louisville, Ky.
Mathews Conveyer Co., Ellwood City, Pa.

CONVEYORS—Monorail
American Monorail Co., The, Cleveland.
Cleveland Tramrail Div. of The Cleveland Crane & Engng. Co., Wickliffe, Ohio.

COPING MACHINES
Cleveland (Ohio) Punch & Shear Works Co., The.
Schatz Mfg. Co., The, Poughkeepsie, N. Y.

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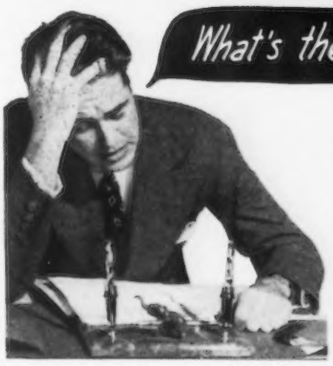

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CORE GRINDERS—Power Operated
Milwaukee (Wis.) Foundry Equipment Co.

CORE OIL
Penola, Inc., Pittsburgh, Pa.
Sun Oil Co., Philadelphia.
Tide Water Associated Oil Co., 17 Battery Place, N. Y. C.

CORUNDUM WHEELS — See Grinding Wheels

COTTERS AND KEYS—Spring
Hindley Mfg. Co., Valley Falls, R. I.
Hubbard, M. D., Spring Co., 351 Central Ave., Pontiac, Mich.
Lamson & Sessions Co., The, Cleveland.
Western Wire Prods. Co., St. Louis, Mo.

COUNTERBORES
Carboloy Co., Inc., 11153 East 8-Mile Road, Detroit, Michigan.
Cleveland (Ohio) Twist Drill Co., The.
Ex-Cell-O Corp., 1210 Oakman Blvd., Detroit, Mich.
Gairing Tool Co., Detroit
Morse Twist Drill & Mch. Co., New Bedford, Mass.

COUNTERS—Production
Streeter-Amet Co., Chicago.
Veeder-Root, Inc., Hartford, Ct.

COUNTING MACHINES
Veeder-Root, Inc., Hartford, Conn.

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Hilliard Corp., The, Railroad Ave., Elmira, N. Y.

COUPLINGS—Flexible
Ajax Flexible Coupling Co., Westfield, N. Y.
Koppers Co., Bartlett Hayward Div., Baltimore, Md.
Lovejoy Flexible Coupling Co., 4979 Lake St., Chicago, Ill.
Morse Chain Co., Ithaca, N. Y.
Poole Foundry & Mch. Co., Baltimore, Md.

COUPLINGS—Fluid
Twin Disc Clutch Co., Racine, Wis.

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Champion Machine & Forging Co., The, Cleveland, Ohio.
Harrisburg (Pa.) Steel Corp.
National Tube Co. (U. S. Steel Corp. Subsidiary), Pittsburgh.

CRANES—Crawling Tractor
American Hoist & Derrick Co., St. Paul, Minn.
Cullen-Friestedt Co., 1303 S. Kilbourn Ave., Chicago.
Harnischfeger Corp., 4401 W. National Ave., Milwaukee.
Industrial Brownhoist Corp., Bay City, Mich.
Ohio Locomotive Crane Co., The, Bucyrus, Ohio.

CRANES — Electric, Industrial, Truck Mounted
Baker-Raulang Co., The, 2175 W. 25th St., Cleveland.
Elwell-Parker Electric Co., The, Cleveland.

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Armel, James P., Pittsburgh.
Cleveland Crane & Engineering Co., Wickliffe, Ohio.
Cleveland Tramrail Div. of The Cleveland Crane & Engrng. Co., Wickliffe, Ohio.
Euclid Crane & Hoist Co., The, Euclid, O.
Harnischfeger Corp., 4401 W. National Ave., Milwaukee, Wis.
Morgan Engineering Co., The, Alliance, O.
Northern Engineering Works, Detroit, Mich.
Reading (Pa.) Chain & Block Corp.
Robbins & Myers, Inc., Springfield, Ohio.
Shaw-Box Crane & Hoist Div. Manning, Maxwell & Moore, Inc., 402 Broadway Muskegon, Mich.
Shepard Niles Crane & Hoist Corp., Montour Falls, N. Y.
Whiting Corp., Harvey, Ill.

CRANES—Gantry
Cleveland Crane & Engineering Co. Wickliffe, Ohio.
Dravo Corp., Engineering Wks. Div. Pittsburgh.
Harnischfeger Corp., 4401 W. National Ave., Milwaukee.
Morgan Engineering Co., The, Alliance, O.
Shaw-Box Crane & Hoist Div. Manning Maxwell & Moore, Inc., 402 Broadway Muskegon, Mich.
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American Monorail Co., The, Cleveland.
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Cleveland Tramrail Div. of The Cleveland Crane & Engrng. Co., Wickliffe, Ohio.
Euclid Crane & Hoist Co., The, Euclid, O.
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Reading (Pa.) Chain & Block Corp.
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Shepard Niles Crane & Hoist Corp., Montour Falls, N. Y.
Whiting Corp., Harvey, Ill.

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American Monorail Co., The, Cleveland.
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Euclid Crane & Hoist Co., The, Euclid, O.
Shaw-Box Crane & Hoist Div. Manning, Maxwell & Moore, Inc., 402 Broadway, Muskegon, Mich.
Whiting Corp., Harvey, Ill.

CRANES—Locomotive
American Hoist & Derrick Co., St. Paul, Minn.
Cullen-Friestedt Co., 1303 S. Kilbourn Ave., Chicago.
Harnischfeger Corp., 4401 W. National Ave., Milwaukee.
Industrial Brownhoist Corp., Bay City, Mich.
Link-Belt Co., 300 West Pershing Road, Chicago, Ill.
Ohio Locomotive Crane Co., The, Bucyrus, O.

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Northern Engineering Works, Detroit.
Reading (Pa.) Chain & Block Corp.
Shaw-Box Crane & Hoist Div. Manning, Maxwell & Moore, Inc., 402 Broadway, Muskegon, Mich.
Shepard Niles Crane & Hoist Corp., Montour Falls, N. Y.

CRANES—Portable
Canton Foundry & Mach. Co. Div. of The Hill Acme Co., 6400 Breakwater Ave., Cleveland, Ohio.

CRANES—Portable Electric
Baker-Raulang Co., The, 2175 W. 25th St., Cleveland.
Elwell-Parker Electric Co., The, Cleveland.

CRANKSHAFTS
Transue & Williams Steel Forging Corp., Alliance, Ohio.
Union Drawn Steel Div. Republic Steel Corp., Massillon, Ohio.

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Bay City Forge Co., Erie, Pa.
Midvale Co., The, Nicetown, Phila., Pa.

CRUSHERS—Coal
American Pulverizer Co., 1439 Macklind Ave., St. Louis, Mo.

CRUSHERS—Steel Turning
American Pulverizer Co., 1439 Macklind Ave., St. Louis, Mo.

CUPOLA CHARGING EQUIPMENT
Atlas Car & Mfg. Co., The, Cleveland, Ohio.
Lake Erie Engineering Corp., 68 Kenmore Sta., Buffalo, N. Y.

CUTTERS & BURRS—Diemakers'
Chicago (Ill.) Wheel & Mfg. Co., 1101 W. Monroe St.

CUTTERS—Die Sinking
Pratt & Whitney Div. Niles-Bement-Pond Co., West Hartford, Conn.
Tomkins-Johnson Co., The, Jackson, Mich.

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CUTTERS—Keyseating
Davis Keyseater Co., 400 Exchange St. Rochester, N. Y.

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Brown & Sharpe Mfg. Co., Providence, R. I.
Carboloy Co., Inc., 11153 East 8-Mile Road, Detroit, Michigan.
Cleveland (Ohio) Twist Drill Co., The.
Gairing Tool Co., The, Detroit.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Pratt & Whitney Div. Niles-Bement-Pond Co., West Hartford, Conn.
Victor Machinery Exchange, 251 Centre St., N. Y. C.

CUTTERS—Rotary Slitting
Hill Acme Co., The, Cleveland, Ohio.

CUTTING-OFF MACHINES—Abrasive
Challenge Machinery Co., Grand Haven, Mich.
Tabor Mfg. Co., Phila.

CUTTING-OFF MACHINES—Cold Saw
Espen-Lucas Mch. Wks., Philadelphia.

CUTTING-OFF MACHINES—Pipe or Tubing
Aetna-Standard Engineering Co., The, Youngstown, Ohio.
Bardons & Oliver, Inc., Cleveland.
Cox & Sons Co., The, Bridgeton, N. J.
Landis Mch. Co., Inc., Waynesboro, Pa.

CUTTING OFF WHEELS
Carborundum Co., The, Niagara Falls, N. Y.

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Hannifin Mfg. Co., Chicago, Ill.
Oilgear Co., The, 1311 W. Bruce St., Milwaukee, Wis.
Tomkins-Johnson Co., The, Jackson, Mich.

CYLINDERS—Seamless
Harrisburg (Pa.) Steel Corp.
Midvale Co., The, Nicetown, Phila., Pa.
National Tube Co. (U. S. Steel Corp Subsidiary), Pittsburgh.

DEGREASING COMPOUNDS
Pennsylvania Salt Mfg. Co., Philadelphia, Pa.

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Vanadium Corp. of America, 420 Lexington Ave., N. Y. C.

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McKenna Metals Co., Latrobe, Pa.

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DIES—Cast Tool Steel
Advance Foundry Co., The, Dayton, Ohio.

DIES—Drawing & Sizing
Budd, Edward G., Mfg. Co., Philadelphia, Pa.
Carboloy Co., Inc., 11153 East 8-Mile Road, Detroit, Michigan.

DIES—Pipe Threading
Greenfield (Mass.) Tap & Die Corp.
Landis Mch. Co., Inc., Waynesboro, Pa.
Murchey Machine & Tool Co., Detroit Mich.
National Acme Co., The, Cleveland.

DIES—Resistance Welding
Mallory, P. R., & Co., Inc., Indianapolis, Ind.

DIES—Screw and Thread Cutting
Eastern Mach. Screw Corp., New Haven, Ct.
Geometric Tool Co., The, New Haven, Conn.
Greenfield (Mass.) Tap & Die Corp.
Hill Acme Co., The, Cleveland, Ohio.
Jones & Lamson Mch. Co., Springfield, Vt.
Landis Mch. Co., Inc., Waynesboro, Pa.
Murchey Machine & Tool Co., Detroit, Mich.
National Acme Co., The, Cleveland.

DIES—Self-Opening Adjustable
Eastern Mach. Screw Corp., New Haven, Ct.
Geometric Tool Co., The, New Haven, Conn.
Hill Acme Co., The, Cleveland, Ohio.
Jones & Lamson Mch. Co., Springfield, Vt.
Landis Mch. Co., Inc., Waynesboro, Pa.
Murchey Machine & Tool Co., Detroit, Mich.
National Acme Co., The, Cleveland, Ohio.

DIES—Sheet Metal Working
Budd, Edward G., Mfg. Co., Philadelphia, Pa.
Cimatool Co., The, Dayton, Ohio.
Worcester (Mass.) Stamped Metal Co., 6 Hunt St.

DIES—Steel Letters and Stamps
Cunningham, M. E., Co., Pittsburgh, Pa.

DIESEL FUEL INJECTORS
Ex-Cell-O Corp., 1210 Oakman Blvd., Detroit, Mich.

DOORS & SHUTTERS, Fireproof
Kinnear Mfg. Co., Columbus, Ohio.

DOORS & SHUTTERS — Steel or Wood Rolling
Kinnear Mfg. Co., Columbus, Ohio.
Mahon, R. C., Co., Detroit, Mich.

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DRESSERS—Grinding Wheel
Carboloy Co., Inc., 11153 E. 8-Mile Rd., Detroit, Mich.

DRILLING MACHINES—Bench
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Davis & Thompson Co., Milwaukee, Wis.

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Millers Falls Co., Greenfield, Mass.

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Helwig Mfg. Co., St. Paul, Minn.
Warner & Swasey Co., The, Cleveland.

DRILLING MACHINES—Radial
Bryant Machinery & Engineering Co., Chicago.
Cincinnati (Ohio) Bickford Tool Co., The.
Cleveland (Ohio) Punch & Shear Works Co., The.

DRILLING MACHINES—Sensitive
Buffalo (N. Y.) Forge Co., 492 Broadway.
Leland-Gifford Co., Worcester, Mass.

DRILLING MACHINES—Upright
Bryant Machinery & Engineering Co., Chicago.
Cincinnati (Ohio) Bickford Tool Co., The.
Cleereman Mch. Tool Co., Green Bay, Wis.

DRILLING MACHINES—Vertical
Cincinnati (Ohio) Bickford Tool Co., The.
Cleereman Mch. Tool Co., Green Bay, Wis.

DRILLING MACHINES—Wall Radial
Lynd-Farquhar Co., Boston, Mass.

DRIVES—Gear
Farrel-Birmingham Co., Inc., Buffalo, N. Y.
Mesta Mch. Co., Pittsburgh.

DRIVES—Single & Multiple V-Belts
Allis-Chalmers Mfg. Co., Milwaukee.

DROP FORGINGS—See Forgings—Drop Iron or Steel

DROP HAMMERS—See Hammers—Drop

DUPLICATING MACHINES
Continental Machines, Inc., 1311 S. Washington Ave., Minneapolis, Minn.

DUST COLLECTORS
Abrasive Machine Tool Co., East Providence, R. I.
American Blower Corp., 6000 Russell St., Detroit, Mich.
American Foundry Equipment Co., The, 510 S. Byrkit St., Mishawaka, Ind.
Blaw-Knox Div. of Blaw-Knox Co., Blawnox, Pa.
Mahon, R. C., Co., Detroit, Mich.
Pangborn Corporation, Hagerstown, Md.
Whiting Corp., Harvey, Ill.

ECONOMIZERS
Babcock & Wilcox Co., The, 85 Liberty St., N. Y. C.

ELECTRIC LIGHTING—Industrial
General Electric Co., Lamp Dept., Nela Park, Cleveland.
Westinghouse Electric & Mfg. Co., Lighting Div., Cleveland, Ohio.

ELECTRIC WELDING — See Welding — Electric

ELECTRICAL EQUIPMENT
Allis-Chalmers Mfg. Co., Milwaukee.

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ELECTRICAL WIRES
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ELECTRODE HOLDERS—Welding
Hobart Bros., Troy, Ohio.
Lincoln Electric Co., The, Cleveland.

ELECTRODES—Resistance Welding
Mallory, P. R., & Co., Inc., Indianapolis, Ind.

ELECTRODES—Welding, Coated
Harnischfeger Corp., 4401 W. National Ave., Milwaukee.
Hobart Bros., Troy, Ohio.
Lincoln Electric Co., The, Cleveland.
Maurath, Inc., 7400 Union Ave., Cleveland.
Metal & Thermit Corp., 120 Broadway, N. Y. C.

ELECTROPLATING EQUIPMENT & SUPPLIES
Hobart Bros., Troy, Ohio.
Meaker Co., The, Chicago, Ill.
United Chromium Incorporated, 51 East 42nd St., N. Y. C.

ELEVATORS—Material Handling
Link-Belt Co., 300 West Pershing Road, Chicago.

EMERY WHEELS—See Grinding Wheels

ENAMELS
American Asphalt Paint Co., Chicago, Ill.

ENGINEERING AND ECONOMIC REPORTS—IRON & STEEL INDUSTRY
McKee, Arthur G., & Co., Cleveland, Ohio.
Pennsylvania Engineering Works, New Castle, Pa.

ENGINEERS & CONTRACTORS
Pennsylvania Engineering Works, New Castle, Pa.

ENGINEERS—Blast Furnace and Steel Plants
McKee, Arthur G., & Co., Cleveland, Ohio.
Pennsylvania Engineering Works, New Castle, Pa.

ENGINEERS—Consulting and Industrial
Koppers Co., Engineering & Construction Div., Pittsburgh.
Lindemuth, Lewis B., 140 Cedar St., N. Y. C.
Pioneer Engineering & Mfg. Co., Detroit.

ENGINES—Gas
Fairbanks, Morse & Co., Chicago, Ill.

EYELET MACHINES
Waterbury (Conn.) Farrel Foundry & Machine Co., The.

FACING MACHINES—Precision
Ex-Cell-O Corp., 1210 Oakman Blvd., Detroit, Mich.

FACTORY & PLANT SITES
Zoll, Edward H., 207 Market St., Newark, N. J.

FANS—Ventilating
American Blower Corp., 6000 Russell St., Detroit, Mich.
Buffalo (N. Y.) Forge Co., 492 Broadway.

FEED WATER HEATERS AND PURIFIERS
Harrisburg (Pa.) Steel Corp.

FEEDS—Hydraulic, for Machines
American Engineering Co., Philadelphia.
Oilgear Co., The, 1311 W. Bruce St., Milwaukee.

FELT—Wool Mechanical
American Felt Co., 315 Fourth Ave., N. Y. C.

FENCING—Wire
Pittsburgh (Pa.) Steel Co.

FENDERS—Rolled Crowned
Stolper Steel Products Corp., Milwaukee, Wis.

FERROALLOYS
Climax Molybdenum Co., 500 Fifth Ave., N. Y. C.
Electro Metallurgical Sales Corp., 30 E. 42nd St., N. Y. C.
Metal & Thermit Corp., 120 Broadway, N. Y. C.
Ohio Ferro-Alloys Corp., Canton, Ohio.
Vanadium Corp. of America, 420 Lexington Ave., N. Y. C.

FERROCHROME
Electro Metallurgical Sales Corp., 30 E. 42nd St., N. Y. C.
Ohio Ferro-Alloys Corp., Canton, Ohio.
Samuel, Frank, & Co., Inc., Philadelphia.
Vanadium Corp. of America, 420 Lexington Ave., N. Y. C.

FERROMANGANESE
Bethlehem (Pa.) Steel Company.
Electro Metallurgical Sales Corp., 30 E. 42nd St., N. Y. C.
Jones & Laughlin Steel Corp., Pittsburgh.
Ohio Ferro-Alloys Corp., Canton, Ohio.
Samuel, Frank & Co., Inc., Philadelphia.

FERROMOLYBDENUM
Climax Molybdenum Co., 500 Fifth Ave., N. Y. C.

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FERROSILICO MANGANESE
Ohio Ferro-Alloys Corp., Canton, Ohio.
Vanadium Corp. of America, 420 Lexington Ave., N. Y. C.

FERROSILICON
Cleveland-Cliffs Iron Co., The, Cleveland Ohio.
Electro Metallurgical Sales Corp., 30 E. 42nd St., N. Y. C.
Ohio Ferro-Alloys Corp., Canton, Ohio.
Samuel, Frank, & Co., Inc., Philadelphia.
Vanadium Corp. of America, 420 Lexington Ave., N. Y. C.

FERROSILICON ALUMINUM
Vanadium Corp. of America, 420 Lexington Ave., N. Y. C.

FERROSPIEGELEISEN
New Jersey Zinc Co., The, 160 Front St., N. Y. C.

FERROTITANIUM
Metal & Thermit Corp., 120 Broadway, N. Y. C.
Vanadium Corp. of America, 420 Lexington Ave., N. Y. C.

FERROVANADIUM
Electro Metallurgical Sales Corp., 30 E 42nd St., N. Y. C.
Vanadium Corp. of America, 420 Lexington Ave., N. Y. C.

FIBRE—Sheets, Tubes, Rods, Fabricated Parts
Continental-Diamond Fibre Co., Newark, Delaware.

FILES & RASPS
Atkins, E. C., & Co., 406 So. Illinois St., Indianapolis, Ind.
Disston, Henry, & Sons, Inc., Philadelphia.
Nicholson File Co., Providence, R. I.

FILING MACHINES
Continental Machines, Inc., 1311 S. Washington Ave., Minneapolis, Minn.

FILTER CLOTH—Asbestos
Johns-Manville Corp., 22 East 40th St. New York City.

FILTERS—Air
Whiting Corp., Harvey, Ill.

FILTERS—Oil
National Acme Co., The, Cleveland.
Nugent, Wm. W., & Co., Inc., Chicago, Ill.

FIRE BRICK
Babcock & Wilcox Co., The, 85 Liberty St., New York City.
Carborundum Co., The Perth Amboy, N. J.

FIRE BRICK—Insulating
Babcock & Wilcox Co., The, 85 Liberty St., N. Y. C.

FIRE CLAY
Illinois Clay Products Co., Joliet, Ill.

FITTINGS—Brass, Pipe and Tube
Commonwealth Brass Corp., Detroit, Mich.

FITTINGS—Welding
Crane Co., Chicago, Ill.

FLANGES—Forged Steel
Harrisburg (Pa.) Steel Corp.
Standard Steel Wks. Div. The Baldwin Locomotive Works, Phila., Pa.

FLANGES—Upset Forged
American Forge Div. The American Brake Shoe & Foundry Co., 2621 So. Hoyne Ave., Chicago, Ill.

FLANGES—Welded Steel
King Fifth Wheel Co., 5031 Beaumont Ave., Philadelphia.

FLANGING WORK—Carbon and Alloy
Worth Steel Co., Claymont, Del.

FLEXIBLE SHAFT EQUIPMENT
Lovejoy Flexible Coupling Co., 4979 Lake St., Chicago, Ill.
Strand, N. A., & Co., Chicago.

FLOODLIGHTS—Acetylene
Linde Air Products Company, The, 30 East 42nd St., N. Y. C.

FLOOR (CONCRETE) Repair Materials
Flexrock Co., 2328 Manning St., Philadelphia, Pa.

FLOOR PLATES—See Plates—Floor or Cellar Door

FLOORING—Acid Proof
Pennsylvania Salt Mfg. Co., Philadelphia, Pa.

FLOORING—Monolithic
Carey, Philip, Co., The, Cincinnati, Ohio.
Johns-Manville Corp., 22 East 40th St New York City.

FLOORING—Open Steel
Blaw-Knox Div. of Blaw-Knox Co., Blawnox, Pa.
Borden Metal Products Co., Elizabeth, New Jersey.
Dravo Corp., Engineering Wks. Div., Pittsburgh.
Hendrick Mfg. Co., Carbondale, Pa.

FLUORSPAR
Hillside Fluor Spar Mines, 38 S. Dearborn St., Chicago, Ill.

FLUX—Soldering (Stainless Steel)
Ruby Chemical Co., Columbus, Ohio.

FLUX—Welding
Linde Air Products Company, The, 30 East 42nd St., N. Y. C.

FORGING MACHINES—Roll
Ajax Mfg. Co., The, Cleveland, Ohio.

FORGING MACHINES—Upset
Ajax Mfg. Co., The, Cleveland, Ohio.
Hill Acme Co., The, Cleveland, Ohio.

FORGINGS—Alloy Steel
American Forge Div. The American Brake Shoe & Foundry Co., 2621 So. Hoyne Ave., Chicago, Ill.
Heppenstall Co., Pittsburgh, Pa.
National Forge & Ordnance Co., Irvine, Pa.

FORGINGS—Aluminum
Aluminum Co. of America, Pittsburgh.

FORGINGS—Brass, Bronze or Copper
American Brass Co., The, Waterbury, Conn.
Chase Brass & Copper Co., Inc., 40 Roland St., Waterbury, Conn.
Commonwealth Brass Corp., Detroit.
Cramp Brass & Iron Foundries Co., Philadelphia.
Harvey Metal Corp., The, Chicago, Ill.
Revere Copper & Brass, Inc., 230 Park Ave., New York City.
Titan Metal Mfg. Co., Bellefonte, Pa.
Transue & Williams Steel Forging Corp., Alliance, Ohio.

FORGINGS—Coin Pressed
Rockford (Ill.) Drop Forge Co.

FORGINGS—Drop, Iron or Steel
Atlas Drop Forge Co., Lansing, Mich.
Canton (Ohio) Drop Forging & Mfg. Co.
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Champion Machine & Forging Co., The, Cleveland, Ohio.
Herbrand Corp., The, Fremont, Ohio.
Poor & Co., Canton Forge & Axle Wks., Canton, Ohio
Rockford (Ill.) Drop Forge Co.
Transue & Williams Steel Forging Corp., Alliance, Ohio.
Warren (Ohio) Tool Corp.
Wilcox, D., Mfg. Co., Mechanicsburg, Pa.
Williams, J. H., & Co., Buffalo, N. Y.

FORGINGS—Hammered
Vulcan Steam Forging Co., Buffalo, N. Y.

FORGINGS—Hollow
American Forge Div. The American Brake Shoe & Foundry Co., 2621 So. Hoyne Ave., Chicago, Ill.
Harrisburg (Pa.) Steel Corp.
Midvale Co., The, Nicetown, Phila., Pa.
National Forge & Ordnance Co., Irvine, Pa.

FORGINGS—Hollow Bored
American Hollow Boring Co., 1912 Raspberry St., Erie, Pa.

FORGINGS—Hydraulic Press, Iron or Steel
Atlas Drop Forge Co., Lansing, Mich.
Bay City Forge Co., Erie, Pa.
Bethlehem (Pa.) Steel Company.
Mesta Mch. Co., Pittsburgh.
Midvale Co., The, Nicetown, Phila., Pa.
National Forge & Ordnance Co., Irvine, Pa
Standard Steel Wks. Div. The Baldwin Locomotive Works, Phila., Pa.

FORGINGS—Magnesium Alloys
American Magnesium Corp., 1701 Gulf Bldg., Pittsburgh.
Dow Chemical Co., The, 921 Jefferson Ave., Midland, Mich.

FORGINGS—Tool Steel
Vulcan Steam Forging Co., Buffalo, N. Y.

FORGINGS—Upset
American Forge Div. The American Brake Shoe & Foundry Co., 2621 So. Hoyne Ave., Chicago, Ill.
Bethlehem (Pa.) Steel Company.
Lamson & Sessions Co., The, Cleveland.
Rockford (Ill.) Drop Forge Co.
Standard Tube Co., The, Detroit, Mich.

FOUNDRY EQUIPMENT & SUPPLIES
Whiting Corp., Harvey, Ill.

FURNACE CONTROLS—Automatic
Amsler-Morton Co., The, Pittsburgh, Pa.

FURNACES—Billet or Ingot Heating
Amsler-Morton Co., The, Pittsburgh, Pa.
Salem (Ohio) Engineering Co.
Swindell-Dressler Corp., Box 1888, Pittsburgh, Pa.
Wean Engineering Co., Inc., Warren, Ohio.

FURNACES—Blast Furnace & Steel Plants
Pennsylvania Engineering Works, New Castle, Pa.

FURNACES—Brass Melting
Stewart Furnace Div., Chicago Flexible Shaft Co., Chicago.

FURNACES—Electric, Steel Melting
American Bridge Co. (U. S. Steel Corp. Subsidiary), Pittsburgh.
Detroit Electric Furnace Div. Kuhlman Electric Co., Bay City, Mich.
Pittsburgh (Pa.) Lectromelt Furnace Corp.
Swindell-Dressler Corp., Box 1888, Pittsburgh, Pa.

FURNACES—Enameling
General Electric Co., Schenectady, N. Y.

FURNACES—Forging
Holcroft & Co., Detroit.
Salem (Ohio) Engineering Co.
Stewart Furnace Div., Chicago Flexible Shaft Co., Chicago.
Wean Engineering Co., Inc., Warren, Ohio.

FURNACES—Heat Treating, Automatic
Holcroft & Co., Detroit.
Leeds & Northrup Co., 4956 Stenton Ave., Philadelphia.
Lindberg Engineering Co., 228 North Laflin St., Chicago, Ill.
Rockwell, W. S., Co., 50 Church St., N.Y.C
Salem (Ohio) Engineering Co.
Stewart Furnace Div., Chicago Flexible Shaft Co., Chicago.
Wean Engineering Co., Inc., Warren, Ohio.

FURNACES—Heat Treating, Controlled Atmosphere
Lindberg Engineering Co., 228 North Laflin St., Chicago, Ill.

FURNACES—Heat Treating, Cyanide or Lead
Johnson Gas Appliance Co., Cedar Rapids, Iowa.
Lindberg Engineering Co., 228 North Laflin St., Chicago, Ill.
Stewart Furnace Div., Chicago Flexible Shaft Co., Chicago.

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General Electric Co., Schenectady, N. Y.
Holcroft & Co., Detroit.
Hoskins Mfg. Co., Detroit, Mich.
Leeds & Northrup Co., 4956 Stenton Ave., Philadelphia.
Lindberg Engineering Co., 228 North Lafin St., Chicago, Ill.
Rockwell, W. S., Co., 50 Church St., N.Y.C
Salem (Ohio) Engineering Co.
Swindell-Dressler Corp., Box 1888, Pittsburgh, Pa.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

FURNACES—Heat Treating, Oil or Gas
Holcroft & Co., Detroit.
Johnson Gas Appliance Co., Cedar Rapids, Iowa.
Lindberg Engineering Co., 228 North Lafin St., Chicago, Ill.
Pennsylvania Industrial Engineers, Pittsburgh.
Salem (Ohio) Engineering Co.
Stewart Furnace Div., Chicago Flexible Shaft Co., Chicago.
Swindell-Dressler Corp., Box 18888, Pittsburgh, Pa.
Wean Engineering Co., Inc., Warren, Ohio.

FURNACES, HEATING—Continuous
Amsler-Morton Co., The, Pittsburgh, Pa.

FURNACES—Non-Ferrous Melting
Detroit Electric Furnace Div. Kuhlman Electric Co., Bay City, Mich.
Johnson Gas Appliance Co., Cedar Rapids, Iowa.

FURNACES—Open Hearth, Consultant
Lindemuth, Lewis B., 140 Cedar St., N. Y. C.

FURNACES—Open Hearth Plants
Amsler-Morton Co., The, Pittsburgh, Pa.
McKee, Arthur G., & Co., Cleveland, Ohio.
Pennsylvania Engineering Works, New Castle, Pa.

FURNACES—Pack Heating Sheets
Aetna-Standard Engineering Co., The, Youngstown, Ohio.
Wean Engineering Co., Inc., The, Warren, Ohio.

FURNACES—Rivet Heating, Gas
Stewart Furnace Div., Chicago Flexible Shaft Co., Chicago.

FURNACES—Tempering
Johnson Gas Appliance Co., Cedar Rapids, Iowa.
Lindberg Engineering Co., 228 North Lafin St., Chicago, Ill.

FURNACES—Wire, Annealing and Galvanizing
General Electric Co., Schenectady, N. Y.
Salem (Ohio) Engineering Co.
Stewart Furnace Div., Chicago Flexible Shaft Co., Chicago.

GAGE BLOCKS
Ford Motor Co. (C. E. Johansson Division), Dearborn, Mich.
Pratt & Whitney Div. Niles-Bement-Pond Co., West Hartford, Conn.

GAGES—Electric
Sheffield Gage Corp., Dayton, Ohio.

GAGES—Plug and Snap
Greenfield (Mass.) Tap & Die Corp.
Pratt & Whitney Div. Niles-Bement-Pond Co., West Hartford, Conn.
Sheffield Gage Corp., Dayton, Ohio.
Taft-Peirce Mfg. Co., The, Woonsocket, R. I.

GAGES—Pressure & Vacuum Recording
Brown Instrument Co., The, Philadelphia, Pa.

GAGES—Sheet Thickness
Streeter-Amet Co., Chicago.

GAGES—Surface
Millers Falls Co., Greenfield, Mass.

GAGES—Thickness Automatic
Pratt & Whitney Div. Niles-Bement-Pond Co., West Hartford, Conn.

GAGES—Thickness, for Rolling Mills
Haines Gauge Co., The, Phila., Pa.

GAGES—Thread Lead
Greenfield (Mass.) Tap & Die Corp.
Jones & Lamson Mch. Co., Springfield, Vt.
Pratt & Whitney Div. Niles-Bement-Pond Co., West Hartford, Conn.
Sheffield Gage Corp., Dayton, Ohio

GALVANIZED IRON PRIME COATING
American Chemical Paint Co., Ambler, Pa.

GALVANIZING—Electro
Meaker Co., The, Chicago, Ill.

GALVANIZING—Hot Dip
American Hot Dip Galvanizers Ass'n, Inc., Pittsburgh.
Cattie, Joseph P., & Bros., Phila.
Enterprise Galvanizing Co., Philadelphia.
Southern Galvanizing Co., Baltimore, Md.
Wilcox, Crittenden & Co., Inc., Middletown, Conn.

GALVANIZING COMPOUNDS
Pennsylvania Salt Mfg. Co., Philadelphia, Pa.

GALVANIZING PLANTS—For Sheets
Aetna-Standard Engineering Co., The, Youngstown, Ohio.
Erie (Pa.) Foundry Co.

GALVANIZING PROCESS—Electro, Wire
Meaker Co., The, Chicago, Ill.

GAS ANALYSIS RECORDERS
Brown Instrument Co., The, Philadelphia, Pa.
Leeds & Northrup Co., 4956 Stenton Ave. Philadelphia.

GAS CLEANING EQUIPMENT — Blast Furnaces
McKee, Arthur G., & Co., Cleveland.
Pennsylvania Engineering Works, New Castle, Pa.

GAS FOR INDUSTRIAL USES
American Gas Association, 420 Lexington Ave., N. Y. C.

GAS PRODUCERS
Koppers Co., Engineering & Construction Div., Pittsburgh.
Morgan Construction Co., Worcester, Mass.
Wood, R. D., & Co., Philadelphia, Pa.

GAS—Boosters & Exhausters
Roots-Connersville Blower Corp., Connersville, Ind.

GASKETS—Asbestos, Metal or Rubber
Garlock Packing Co., The, Palmyra, N. Y.
Johns-Manville Corp., 22 East 40th St., New York City.

GEAR CHECKING EQUIPMENT
Michigan Tool Co., Detroit, Mich.

GEAR CUTTING
Earle Gear & Machine Co., Phila.
Farrel-Birmingham Co., Inc., Buffalo, N.Y.
Gleason Works, Rochester, N. Y.
Hartford (Conn.) Special Machinery Co. The.
National-Erie Corp., Erie, Pa.
Taylor-Wilson Mfg. Co., McKees Rocks, Pa.
Waltham (Mass.) Watch Co.

GEAR CUTTING MACHINES
Farrel-Birmingham Co., Inc., Buffalo, N.Y.
Gleason Works, Rochester, N. Y.

GEAR DRIVES—Herringbone
Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh.
United Engineering & Fdry. Co., Pitgh.

GEAR LAPPING MACHINES
Michigan Tool Co., Detroit, Mich.
National Broach & Machine Co., Detroit, Mich.

GEARMOTORS
Allis-Chalmers Mfg. Co., Milwaukee.
General Electric Co., Schenectady, N. Y.
Reliance Electric & Engineering Co., Cleveland, Ohio.
Westinghouse Elec. & Mfg. Co., East Pitgh.

GEAR PLANING MACHINES
Gleason Works, Rochester, N. Y.

GEAR SHAVING MACHINES
Michigan Tool Co., Detroit, Mich.
National Broach & Machine Co., Detroit, Mich.

GEAR TESTING MACHINES
National Broach & Machine Co., Detroit, Mich.

GEARS—Bevel
Gleason Works, Rochester, N. Y.
National-Erie Corp., Erie, Pa.

GEARS—Heat Treated
Gleason Works, Rochester, N. Y.
Simonds Gear & Mfg. Co., Pittsburgh.

GEARS—Herringbone
Farrel-Birmingham Co., Inc., Buffalo, N.Y
Mesta Mch. Co., Pittsburgh.

GEARS—Machine Cut
Gleason Works, Rochester, N. Y.
National-Erie Corp., Erie, Pa.
Simonds Gear & Mfg. Co., Pittsburgh.

GEARS—Machine Molded
Poole Foundry & Mch. Co., Baltimore, Md

GEARS—Non-Metallic
Chicago (Ill.) Rawhide Mfg. Co., The, 1306 Elston Ave.
Continental-Diamond Fibre Co., Newark, Delaware.

GEARS—Rawhide
Chicago (Ill.) Rawhide Mfg. Co., The, 1306 Elston Ave.

GEARS—Reverse
Twin Disc Clutch Co., Racine, Wis.

GEARS—Reverse Marine
Twin Disc Clutch Co., Racine, Wis.

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Simonds Gear & Mfg. Co., Pittsburgh.

GEARS—Teeth Ground
Hartford (Conn.) Special Machinery Co., The.

GEARS—Worm
Cone Worm Gear Div., Michigan Tool Co., Detroit, Mich.

GENERATORS—Acetylene
Air Reduction, 60 East 42nd St., N. Y. C.
Linde Air Products Company, The, 30 East 42nd St., N. Y. C.

GENERATORS—Electric
Fairbanks, Morse & Co., Chicago, Ill.
General Electric Co., Schenectady, N. Y
Hobart Bros., Troy, Ohio.
Lincoln Electric Co., The, Cleveland.
Reliance Electric & Engineering Co., Cleveland, Ohio.
Westinghouse Elec. & Mfg. Co., East Pitgh

GENERATORS—Electric, Second Hand. (See Clearing House Section)

GENERATORS—Pleting
Meaker Co., The, Chicago, Ill.

GLOVES—Asbestos & Fireproof
American Optical Co., Southbridge, Mass.

GOGGLES—Safety
American Optical Co., Southbridge, Mass.

GOVERNORS—Air Compressor
Westinghouse Air Brake Co., Industrial Div., Pittsburgh.

GRATING—Flooring, Sidewalk, etc.—See Flooring—Open Steel

GREASE—Lubricating
Gulf Oil Corp., Gulf Refining Co., Pittsburgh.
Penola, Inc., Pittsburgh.
Pure Oil Co., The, Chicago.
Shell's Industrial Lubricants Div., Shell Bldg., San Francisco, Shell Bldg., St. Louis, & 50 W. 50th St., N. Y. C.
Standard Oil Co. (Indiana), Chicago.
Sun Oil Co., Philadelphia.
Texas Company, The, 135 East 42nd St., N. Y. C.
Tide Water Associated Oil Co., 17 Battery Place, N. Y. C.

GRILLES—Metal Cane
Diamond Mfg. Co., Wyoming, Pa.
Mundt, Chas., & Sons, 59 Fairmount Ave., Jersey City, N. J.

GRILLES—Perforated Metal
Diamond Mfg. Co., Wyoming, Pa.
Erdle Perforating Co., Rochester, N. Y.
Harrington & King Perforating Co., The, Chicago.
Mundt, Chas., & Sons, 59 Fairmount Ave., Jersey City, N. J.

GRINDERS—Carbide Tool
Ex-Cell-O Corp., 1210 Oakman Blvd., Detroit, Mich.

GRINDING
Defiance Screw Mch. Prods. Div. of The Serrick Corp., Defiance, Ohio.

GRINDING AND POLISHING MACHINES
Bryant Machinery & Engineering Co., Chicago.
Excelsior Tool & Mch. Co., E. St. Louis, Ill
Norton Co., Worcester, Mass.
Safety Grinding Wheel & Machine Co., The, Springfield, Ohio.

GRINDING MACHINES—Centerless
Cincinnati (Ohio) Grinders Incorporated.

GRINDING MACHINES—Chucking
Bryant Chucking Grinder Co., Springfield, Vt.

GRINDING MACHINES — Cutter & Reamer
Cincinnati (Ohio) Milling Mch. Co., The.
Gallmeyer & Livingston Co., Grand Rapids, Mich.
Landis Tool Co., Waynesboro, Pa.
LeBlond, R. K., Machine Tool Co., Cincinnati.

GRINDING MACHINES—Cylinder
Heald Machine Co., Worcester, Mass.

GRINDING MACHINES—Cylindrical
Brown & Sharpe Mfg. Co., Providence, R.I.
Cincinnati (Ohio) Grinders Incorporated.
Landis Tool Co., Waynesboro, Pa.
Norton Co., Worcester, Mass.

GRINDING MACHINES—Die
Landis Mch. Co., Inc., Waynesboro, Pa.

GRINDING MACHINES—Drill
Gallmeyer & Livingston Co., Grand Rapids, Mich.
Sellers, William, & Co., Inc., 1620 Hamilton St., Philadelphia, Pa.

GRINDING MACHINES—Gear & Worm
Pratt & Whitney Div. Niles-Bement-Pond Co., West Hartford, Conn.

GRINDING MACHINES—Internal
Bryant Chucking Grinder Co., Springfield, Vt.
Heald Machine Co., Worcester, Mass.

GRINDING MACHINES—Internal Centerless
Heald Machine Co., Worcester, Mass.

GRINDING MACHINES—Internal Multiple Spindle
Baird Mch. Co., The, Bridgeport, Conn.

GRINDING MACHINES—Portable Electric
Chicago (Ill.) Wheel & Mfg. Co., 1101 W. Monroe St.
Millers Falls Co., Greenfield, Mass.

GRINDING MACHINES—Portable Flexible Shaft
Pratt & Whitney Div. Niles-Bement-Pond Co., West Hardford, Conn.
Strand, N. A., & Co., Chicago.

GRINDING MACHINES—Precision Thread
Ex-Cell-O Corp., 1210 Oakman Blvd., Detroit, Mich.
Jones & Lamson Machine Co., Springfield, Vt.

GRINDING MACHINES—Roll
Cincinnati (Ohio) Grinders Incorporated.
Farrel-Birmingham Co., Inc., Ansonia, Conn.
Landis Tool Co., Waynesboro, Pa.

GRINDING MACHINES—Surface
Abrasive Machine Tool Co., E. Prov., R. I.
Blanchard Machine Co., Cambridge, Mass.
Gallmeyer & Livingston Co., Grand Rapids, Mich.
Heald Machine Co., Worcester, Mass.
Hill Acme Co., The, Cleveland, Ohio.
Mattison Machine Works, Rockford, Ill.
Norton Co., worcester, Mass.
Pratt & Whitney Div. Niles-Bement-Pond Co., West Hartford, Conn.

GRINDING MACHINES—Swing Frame
Safety Grinding Wheel & Machine Co., The, Springfield, Ohio.
Shuster, F. B., Co., The, New Haven, Conn.

GRINDING MACHINES—Tap
Gallmeyer & Livingston Co., Grand Rapids, Mich.
Jones & Lamson Machine Co., Springfield, Vt.

GRINDING MACHINES—Tool
Cincinnati (Ohio) Milling Mch. Co., The.
Gallmeyer & Livingston Co., Grand Rapids, Mich.
Gisholt Machine Co., Madison, Wis.
Landis Tool Co., Waynesboro, Pa.
LeBlond, R. K., Mch. Tool Co., Cincinnati.
Norton Co., Worcester, Mass.
Sellers, William, & Co., Inc., 1620 Hamilton St., Philadelphia, Pa.

GRINDING MACHINES—Universal
Cincinnati (Ohio) Grinders Incorporated.
Continental Machines, Inc., 1311 S. Washington Ave., Minneapolis, Minn.
Landis Tool Co., Waynesboro, Pa.
Norton Co., Worcester, Mass.

GRINDING MACHINES—Valve
Landis Tool Co., Waynesboro, Pa.

GRINDING WHEELS
Blanchard Machine Co., Cambridge, Mass.
Carborundum Co., The Niagara Falls, N. Y.
Chicago (Ill.) Wheel & Mfg. Co., 1101 W. Monroe St.
Manhattan Rubber Mfg. Div. of Raybestos-Manhattan Inc., The, 32 Townsend St., Passaic, N. J.
Norton Co., Worcester, Mass.

GRINDING WHEELS—Mounted, Pencil
Chicago (Ill.) Wheel & Mfg. Co., 1101 W. Monroe St.

GRINDING WHEELS—Segment
Blanchard Machine Co., Cambridge, Mass.

GRIT—Steel
Harrison Abrasive Corp., Manchester, N. H.
Pittsburgh (Pa.) Crushed Steel Co.

HACK SAW BLADES—See Saws—Hack Saw Blades

HACK SAW MACHINES
Armstrong-Blum Mfg. Co., Chicago.
Atkins, E. C., & Co., 406 So. Illinois St., Indianapolis, Ind.

HAMMERS—Air, Forging
Chambersburg (Pa.) Engineering Co.
Lake Erie Engineering Corp., 68 Kenmore Sta., Buffalo, N. Y.
Lobdell Car Wheel Co., Nazel Hammer Div., Wilmington, Del.

HAMMERS—Drop
Ajax Mfg. Co., The, Cleveland.
Chambersburg (Pa.) Engineering Co.
Erie (Pa.) Foundry Co.
Morgan Engineering Co., The, Alliance, O.

HAMMERS—Helve
Bradley, C. C., & Son, Inc., Syracuse, N. Y.

HAMMERS—Machinists'
Ushco Mfg. Co., Inc., 135 Tonawanda St., Buffalo, N. Y.

HAMMERS—Power
Bradley, C. C., & Son, Inc., Syracuse, N. Y.

HAMMERS—Rawhide
Chicago (Ill.) Rawhide Mfg. Co., 1306 Elston Ave.

HAMMERS—Steam
Chambersburg (Pa.) Engineering Co.
Erie (Pa.) Foundry Co.
Morgan Engineering Co., The, Alliance, O.

HAMMERS—Welder's Chipping
Chicago (Ill.) Mfg. & Distributing Co.

HANGER BEARINGS
Dodge Mfg. Corp., Mishawaka, Ind.

HANGERS—Ball Bearing
Fafnir Bearing Co., New Britain, Conn.
S K F Industries, Inc., Front St. & Erie Ave., Phila., Pa.

HANGERS—Roller Bearing
Hyatt Bearings Div. General Motors Sales Corp., Harrison, N. J.

HANGERS—Shaft
Dodge Mfg. Corp., Mishawaka, Ind.

HEADING MACHINES
Ajax Mfg. Co., The, Cleveland, Ohio.
Waterbury (Conn.) Farrel Foundry & Machine Co., The.

HEADS—Spun and Pressed
Worth Steel Co., Claymont, Del.

HEAT TREATING
Barnes-Gibson-Raymond, Detroit Plant Div. of Associated Spring Corp.
Barnes, Wallace Co., Div. of Associated Spring Corp., Bristol, Conn.
General Machine Wks., York, Pa.
Parish Pressed Steel Co., Reading, Pa.
Pennsylvania Industrial Engineers, Pittsburgh.
Vulcan Steam Forging Co., Buffalo, N. Y.

HEATERS—Unit
Dravo Corp., Engineering Wks. Div., Pittsburgh.

HOISTS—Air
Detroit (Mich.) Hoist & Mach. Co.
Northern Engineering Works, Detroit.

HOISTS—Chain
Reading (Pa.) Chain & Block Corp.
Yale & Towne Mfg. Co., The, Phila. Div., Phila., Pa.

HOISTS—Electric
American Engineering Co., Philadelphia.
Cleveland Tramrail Div. of The Cleveland Crane & Engineering Co., Wickliffe, Ohio.
Detroit (Mich.) Hoist & Mach. Co.
Euclid Crane & Hoist Co., The, Euclid, O.
Harnischfeger Corp., 4401 W. National Ave., Milwaukee, Wis.
Northern Engineering Works, Detroit, Mich.
Reading (Pa.) Chain & Block Corp.
Robbins & Myers, Inc., Springfield, Ohio.
Shaw-Box Crane & Hoist Div. Manning, Maxwell & Moore, Inc., 402 Broadway, Muskegon, Mich.
Shepard Niles Crane & Hoist Corp., Montour Falls, N. Y.
Yale & Towne Mfg. Co., The, Phila. Div., Phila., Pa.

Products Index

HOISTS—Electric Traveling
American Engineering Co., Philadelphia.
American Monorail Co., The, Cleveland.
Cleveland Tramrail Div. of The Cleveland Crane & Engng. Co., Wickliffe, Ohio.
Euclid Crane & Hoist Co., The, Euclid, O.
Northern Engineering Works, Detroit.
Shaw-Box Crane & Hoist Div. Manning, Maxwell & Moore, Inc., 402 Broadway, Muskegon, Mich.

HOISTS—Monorail
American Engineering Co., Philadelphia.
Cleveland Tramrail Div. of The Cleveland Crane & Engng. Co., Wickliffe, Ohio.
Euclid Crane & Hoist Co., The, Euclid, O.
Northern Engineering Works, Detroit.
Shaw-Box Crane & Hoist Div. Manning, Maxwell & Moore, Inc., 402 Broadway, Muskegon, Mich.
Shepard Niles Crane & Hoist Corp., Montour Falls, N. Y.

HONING MACHINES
Micromatic Hone Corp., Detroit, Mich.

HOSE—Air, Oil, Steam and Water
Hewitt Rubber Corp., Buffalo, N. Y.

HOSE—Flexible Metallic
American Brass Co., The, Waterbury, Conn.

HOSE—Rubber
Hewitt Rubber Corp., Buffalo, N. Y.
Manhattan Rubber Mfg. Div. of Raybestos-Manhattan Inc., The, 2 Townsend St., Passaic, N. J.

HOUSINGS—Engine & Machine
Stolper Steel Products Corp., Milwaukee, Wis.

HYDRANTS—Fire
Wood, R. D., & Co., Philadelphia, Pa.

HYDRAULIC MACHINERY
Baldwin-Southwark Div. Baldwin Locomotive Wks., Philadelphia.
Denison Engineering Co., The, 108 W. Chestnut St., Columbus, Ohio.
Farquhar, A. B., Co., Ltd., York, Pa.
Hannifin Mfg. Co., Chicago, Ill.
Lake Erie Engineering Corp., 68 Kenmore Sta., Buffalo, N. Y.
Morgan Engineering Co., The, Alliance, O.
Oilgear Co., The, 1311 W. Bruce St., Milwaukee, Wis.
Wood, R. D., & Co., Philadelphia, Pa.

HYDRAULIC POWER UNITS
Ex-Cell-O Corp., 1210 Oakman Blvd., Detroit, Mich.
Oilgear Co., The, 1311 W. Bruce St., Milwaukee, Wis.
Twin Disc Clutch Co., Racine, Wis.

INDICATORS—Sight Flow
Nugent, Wm. W., & Co., Inc., Chicago, Ill.

INGOT MOLDS
Shenango-Penn Mold Co., Dover, Ohio.
Valley Mould & Iron Corp., Hubbard, Ohio.

INGOTS—Aluminum
Aluminum Co. of America, Pittsburgh.

INHIBITORS
American Chemical Paint Co., Ambler, Pa.

INSTRUMENTS—Electric
General Electric Co., Schenectady, N. Y.

INSTRUMENTS—Recording
Brown Instrument Co., The, Philadelphia, Pa.
Leeds & Northrup Co., 4956 Stenton Ave., Philadelphia.

INSULATING MATERIALS—Electrical
Continental-Diamond Fibre Co., Newark, Delaware.

INSULATION
Illinois Clay Products Co., Joliet, Ill.
Johns-Manville Corp., 22 East 40th St., New York City.

IRON—Genuine Open Hearth Iron
Newport (Ky.) Rolling Mill Co., The, Div. of The Andrews Steel Co.

IRON—Rustless
Allegheny Ludlum Steel Corp., Pittsburgh, Pa.

IRON WORKERS—Universal
Buffalo (N. Y.) Forge Co., 492 Broadway.

JIGS, FIXTURES, DIES, etc. (See Dies, Jigs, Fixtures, etc.)

KEYS—Riveted
Western Wire Prods. Co., St. Louis, Mo.

KEYSEATING MACHINES
Davis Keyseater Co., 400 Exchange St., Rochester, N. Y.

KNIVES—Machine
Hill Acme Co., The, Cleveland, Ohio.

LACING—Belt, Rawhide or Leather
Chicago (Ill.) Rawhide Mfg. Co., The, 1306 Elston Ave.

LAMPS—Filament
General Electric Co., Lamp Dept., Nela Park, Cleveland.
Westinghouse Electric & Mfg. Co., Lighting Div., Cleveland, Ohio.

LAMPS—Mercury Vapor
General Electric Co., Lamp Dept., Nela Park, Cleveland.

LAPPING MACHINES
Cincinnati (Ohio) Grinders Incorporated.

LAPPING PLATES
Challenge Machinery Co., Grand Haven, Mich.

LATHE ATTACHMENTS
South Bend (Ind.) Lathe Works, 587 East Madison St.

LATHES—Automatic
Baird Mch. Co., The, Brideport, Conn.
Bullard Co., The, Bridgeport, Conn.
Gisholt Machine Co., Madison, Wis.
Goss & De Leeuw Mch. Co., New Britain, Conn.
Jones & Lamson Mch. Co., Springfield, Vt.
LeBlond, R. K., Mch. Tool Co., Cincinnatti.
Monarch Mch. Tool Co., The, Sidney, O.
Potter & Johnston Machine Co., Pawtucket, R. I.

LATHES—Automatic Vertical
Baird Mch. Co., The, Bridgeport, Conn.
Bullard Co., The, Bridgeport, Conn.

LATHES—Bench
Pratt & Whitney Div. Niles-Bement-Pond Co., West Hartford, Conn.
South Bend (Ind.) Lathe Works, 587 East Madison St.

LATHES—Brass
Gisholt Machine Co., Madison, Wisconsin.
Jones & Lamson Machine Co., Springfield, Vt.
South Bend (Ind.) Lathe Works, 587 East Madison St.
Warner & Swasey Co., The, Cleveland.

LATHES—Car-Wheel
Sellers, William, & Co., Inc., 1620 Hamilton St., Philadelphia, Pa.

LATHES—Chucking
Gisholt Machine Co., Madison, Wisconsin.
Jones & Lamson Mch. Co., Springfield, Vt.
Potter & Johnston Machine Co., Pawtucket, R. I.
South Bend (Ind.) Lathe Works, 587 East Madison St.
Warner & Swasey Co., The, Cleveland.

LATHES—Contour Turning
Monarch Mch. Tool Co., The, Sidney, O.

LATHES—Crankshaft
LeBlond, R. K., Mch. Tool Co., Cincinnati.
Potter & Johnston Machine Co., Pawtucket, R. I.

LATHES—Engine
Bryant Machinery & Engineering Co., Chicago.
Cincinnati (Ohio) Lathe & Tool Co.
Hendey Machine Co., Torrington, Conn.
Hill-Clarke Mchry. Co., 647 W. Washington Blvd., Chicago.
LeBlond, R. K., Mch. Tool Co., Cincinnati.
Monarch Mch. Tool Co., The, Sidney, O.
Pratt & Whitney Div. Niles-Bement-Pond Co., West Hartford, Conn.
Reed-Prentice Corp., Worcester, Mass.
South Bend (Ind.) Lathe Works, 587 East Madison St.

LATHES—High Speed
Hendey Machine Co., Torrington, Conn.
South Bend (Ind.) Lathe Works, 587 East Madison St.

LATHES—Roll
Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh.
Mesta Mch. Co., Pittsburgh.
United Engineering & Fdry. Co., Ptgh.

LATHES — Second-Hand. (See Clearing House Section)

LATHES—Toolroom
Cincinnati (Ohio) Lathe & Tool Co.
LeBlond, R. K., Machine Tool Co., Cincinnati, Ohio.
Monarch Mch. Tool Co., The, Sidney, O.
Pratt & Whitney Div. Niles-Bement-Pond Co., West Hartford, Conn.
South Bend (Ind.) Lathe Works, 587 East Madison St.

LATHES—Turret
Acme Machine Tool Co., The, Cincinnati, Ohio.
Bardons & Oliver, Inc., Cleveland.
Bullard Co., The, Bridgeport, Conn.
Gisholt Machine Co., Madison, Wis.
Jones & Lamson Mch. Co., Springfield, Vt.
Potter & Johnston Machine Co., Pawtucket, R. I.
South Bend (Ind.) Lathe Works, 587 East Madison St.
Warner & Swasey Co., The, Cleveland.

LATHES, Turret, Vertical
Bullard Co., The, Bridgeport, Conn.

LAYOUT SURFACE PLATES
Challenge Machinery Co., Grand Haven, Mich.

LEAD LININGS
National Lead Co., 111 Bdway., N. Y. C.

LEAD—In Oil
National Lead Co., 111 Bdway., N. Y. C.

LEAD—Tellurium
National Lead Co., 111 Bdway., N. Y. C.

LEATHER—Cup
Chicago (Ill.) Rawhide Mfg. Co., The, 1306 Elston Ave.

LEGGINS—Safety
American Optical Co., Southbridge, Mass.

LEVELING MACHINES
Aetna-Standard Engineering Co., The, Youngstown, Ohio.
McKay Machine Co., The, Youngstown, Ohio.
Schatz Mfg. Co., The, Poughkeepsie, N. Y.
Wean Engineering Co., Inc., The, Warren, O.

LOCOMOTIVES—Diesel
Atlas Car & Mfg. Co., The, Cleveland, Ohio.

LOCOMOTIVES—Gasoline
Plymouth (Ohio) Locomotive Works Div. Fate-Root-Heath Co.

LOCOMOTIVES—Industrial
Plymouth (Ohio) Locomotive Works Div Fate-Root-Heath Co.

LOCOMOTIVES—Steam
Iron & Steel Products, Inc., Chicago.

LUBRICANTS—Crusher & Grinding
Acheson Colloids Corp., Port Huron, Mich.
Gulf Oil Corp., Gulf Refining Co., Pittsburgh.
Shell's Industrial Lubricants Div., Shell Bldg., San Francisco, Shell Bldg., St. Louis, & 50 W. 50th St., N. Y. C.
Sun Oil Co., Philadelphia.
Texas Company, The, 135 East 42nd St., N. Y. C.
Tide Water Associated Oil Co., 17 Battery Place, N. Y. C.

LUBRICANTS—Gear
Acheson Colloids Corp., Port Huron, Mich.
Cities Service Oil Co., 60 Wall Tower, N. Y. C.
Gulf Oil Corp., Gulf Refining Co., Pittsburgh.

If You Do Welding

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Welding flame automatically shuts off as hold on torch is released, saving gases otherwise wasted between welds. When operator is again ready to weld, torch is instantly brought back to full flame—no relighting, no readjusting of torch. Tests show average gas savings per man of $4.80 per day and increased production of from 100% to 148%. Weight 13 oz., length including tip 14½", tip size No. 1 thru No. 8. Price $24.00 at Detroit, tips extra $1.00 each. Model W is same torch without lever lock, priced at $23.00.
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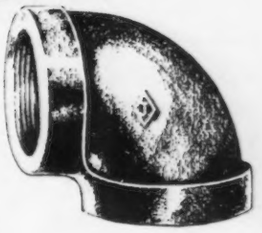

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Erie, Pa., U. S. A.

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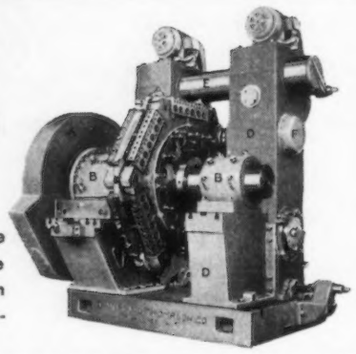

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(PITTSBURGH DISTRICT)

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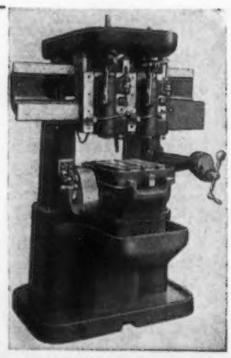
MOTOR DRIVE



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Products Index

Shell's Industrial Lubricants Div., Shell Bldg., San Francisco, Shell Bldg., St. Louis, & 50 W. 50th St., N. Y. C.
Standard Oil Co. (Indiana), Chicago.
Sun Oil Co., Philadelphia.
Texas Company, The, 135 East 42nd St., N. Y. C.
Tide Water Associated Oil Co., 17 Battery Place, N. Y. C.

LUBRICANTS—Graphite
Acheson Colloids Corp., Port Huron, Mich.

LUBRICANTS—High Pressure & Temperature
Gulf Oil Corp., Gulf Refining Co., Pittsburgh.
Penola, Inc., Pittsburgh, Pa.
Pure Oil Co., The, Chicago.
Shell's Industrial Lubricants Div., Shell Bldg., San Francisco, Shell Bldg., St. Louis, & 50 W. 50th St., N. Y. C.
Standard Oil Co. (Indiana), Chicago.
Sun Oil Co., Philadelphia.
Texas Company, The, 135 East 42nd St., N. Y. C.
Tide Water Associated Oil Co., 17 Battery Place, N. Y. C.

LUBRICANTS—Mine Cars
Acheson Colloids Corp., Port Huron, Mich.
Cities Service Oil Co., 60 Wall Tower, N. Y. C.
Gulf Oil Corp., Gulf Refining Co., Pittsburgh.
Shell's Industrial Lubricants Div., Shell Bldg., San Francisco, Shell Bldg., St. Louis, & 50 W. 50th St., N. Y. C.
Sun Oil Co., Philadelphia.
Texas Company, The, 135 East 42nd St., N. Y. C.
Tide Water Associated Oil Co., 17 Battery Place, N. Y. C.

LUBRICANTS—Mining Machines
Acheson Colloids Corp., Port Huron, Mich.
Gulf Oil Corp., Gulf Refining Co., Pittsburgh.
Shell's Industrial Lubricants Div., Shell Bldg., San Francisco, Shell Bldg., St. Louis, & 50 W. 50th St., N. Y. C.
Sun Oil Co., Philadelphia.
Texas Company, The, 135 East 42nd St., N. Y. C.
Tide Water Associated Oil Co., 17 Battery Place, N. Y. C.

LUBRICANTS—Railroad
Cities Service Oil Co., 60 Wall Tower, N. Y. C.
Gulf Oil Corp., Gulf Refining Co., Pittsburgh.
Shell's Industrial Lubricants Div., Shell Bldg., San Francisco, Shell Bldg., St. Louis, & 50 W. 50th St., N. Y. C.
Sun Oil Co., Philadelphia.
Texas Company, The, 135 East 42nd St., N. Y. C.
Tide Water Associated Oil Co., 17 Battery Place, N. Y. C.

LUBRICANTS—Roll Neck—Anti-Friction & Plain
Cities Service Oil Co., 60 Wall Tower, N. Y. C.
Gulf Oil Corp., Gulf Refining Co., Pittsburgh.
Penola, Inc., Pittsburgh, Pa.
Shell's Industrial Lubricants Div., Shell Bldg., San Francisco, Shell Bldg., St. Louis, & 50 W. 50th St., N. Y. C.
Standard Oil Co. (Indiana), Chicago.
Sun Oil Co., Philadelphia.
Texas Company, The, 135 E. 42nd St., N. Y. C.
Tide Water Associated Oil Co., 17 Battery Place, N. Y. C.

LUBRICANTS—Tipple & Cleaning
Gulf Oil Corp., Gulf Refining Co., Pittsburgh.
Shell's Industrial Lubricants Div., Shell Bldg., San Francisco; Shell Bldg., St. Louis, and 50 W. 50th St., N. Y. C.
Sun Oil Co., Philadelphia.
Texas Company, The, 135 East 42nd St., N. Y. C.
Tide Water Associated Oil Co., 17 Battery Place, N. Y. C.

MACHINE WORK
Central Machine Works, Worcester, Mass.
Diamond Iron Works, Inc., Minneapolis, Minn.
Erie (Pa.) Malleable Iron Co.
General Machine Works, York, Pa.
Hoe, R., & Co., Inc., 910 E. 138th St., New York City
Taft-Peirce Mfg. Co., The, Woonsocket, R. I.
Treadwell Engineering Co., Easton, Pa.

MACHINERY DEALERS—Second-Hand (See Clearing House Section)

MACHINISTS' SMALL TOOLS
Brown & Sharpe Mfg. Co., Providence, R. I.
Millers Falls Co., Greenfield, Mass.

MAGNESIUM
American Magnesium Corp., 1701 Gulf Bldg., Pittsburgh.
Dow Chemical Co., The, 921 Jefferson Ave., Midland, Mich.

MAGNETS—Lifting
Cutler-Hammer, Inc., Milwaukee.
Dings Magnetic Separator Co., 727 Smith St., Milwaukee.
Electric Controller & Mfg. Co., The, Cleve.
Ohio Electric Mfg. Co., The, 5908 Maurice Ave., Cleveland.

MAGNETS — Separating—See Separators—Magnetic

MALLETS—Rawhide
Chicago (Ill.) Rawhide Mfg. Co., The, 1306 Elston Ave.

MANDRELS—Expanding
Nicholson, W. H., & Co., 165 Oregon St., Wilkes-Barre, Pa.

MANGANESE METAL AND ALLOYS
Electro Metallurgical Sales Corp., 30 East 42nd St., N. Y. C.

MANGANESE ORES—See ORES—Manganese

MANHOLE FITTINGS AND SADDLES
Worth Steel Co., Claymont, Del.

MANIFOLDS—Oxygen & Acetylene
Air Reduction, 60 East 42nd St., N. Y. C.
Linde Air Products Company, The, 30 East 42nd St., N. Y. C.

METAL CLEANING COMPOUNDS
Detroit Rex Products Co., Detroit, Mich.
Ford, J. B. Sales Co., The, Wyandotte, Mich.
Pennsylvania Salt Mfg. Co., Philadelphia.

METAL SPECIALTIES
Borden Metal Products Co., Elizabeth, New Jersey.
Budd, Edward G., Mfg. Co., Philadelphia, Pa.
Chase Brass & Copper Co., Inc., 40 Roland St., Waterbury, Conn.
Crosby Co., The, Buffalo, N. Y.
Mattatuck Mfg. Co., The, 1900 East Main St., Waterbury, Conn.
Torrington (Conn.) Company.
Whitehead Stamping Co., 1669 W. Lafayette Blvd., Detroit, Mich.
Worcester (Mass.) Stamped Metal Co., 6 Hunt St.

METERS—Electric Welding
Lincoln Electric Co., The, Cleveland.

METERS—Flow
Brown Instrument Co., The, Philadelphia, Pa.
Leeds & Northrup Co., 4956 Stenton Ave., Philadelphia.

METERS—Gas or Air
Roots-Connersville Blower Corp., Connersville, Ind.

MICA
Continental-Diamond Fibre Co., Newark, Delaware.

MICROMETERS—Dial for Sheet Metal
Haines Gauge Co., The, Phila., Pa.

MICROMETERS—Tubular Bow & Bar
Davis & Thompson Co., Milwaukee, Wis.

MILLING MACHINES—Automatic
Cincinnati (Ohio) Milling Mch. Co., The.
Jones & Lamson Machine Co., Springfield, Vt.
Kearney & Trecker Corp., Milwaukee, Wisc.
Potter & Johnston Machine Co., Pawtucket, R. I.

MILLING MACHINES—Continuous
Davis & Thompson Co., Milwaukee, Wis.

MILLING MACHINES—Horizontal
Brown & Sharpe Mfg. Co., Prov., R. I.
Cincinnati (Ohio) Milling Mch. Co., The.
Kearney & Trecker Corp., Milwaukee, Wisc.
Ohio Machine Tool Co., Kenton, Ohio.
Potter & Johnston Machine Co., Pawtucket, R. I.

MILLING MACHINES—Planer Type
Cincinnati (Ohio) Planer Co.
Consolidated Machine Tool Corp., Rochester, N. Y.
Sellers, William, & Co., Inc., 1620 Hamilton St., Philadelphia, Pa.

MILLING MACHINES — Second - Hand. (See Clearing House Section)

MILLING MACHINES—Vertical
Brown & Sharpe Mfg. Co., Prov., R. I.
Cincinnati (Ohio) Milling Mch. Co., The.
Kearney & Trecker Corp., Milwaukee, Wisc.
National Broach & Machine Co., Detroit, Mich.
Potter & Johnston Machine Co., Pawtucket, R. I.
Reed-Prentice Corp., Worcester, Mass.

MOLDING MACHINES
Tabor Mfg. Co., Phila., Pa.

MOLDING MACHINES—Jolt Pin Strip
Milwaukee (Wis.) Foundry Equipment Co.

MOLDING MACHINES — Jolt Squeeze Rollover Pattern Draw
Milwaukee (Wis.) Foundry Equipment Co.

MOLDING MACHINES—Jolt Squeeze Stripper
Milwaukee (Wis.) Foundry Equipment Co.

MOLDING MACHINES—Jolt Squeezer
Milwaukee (Wis.) Foundry Equipment Co.

MOLDING MACHINES—Power Strippers
Milwaukee (Wis.) Foundry Equipment Co.

MOLDING MACHINES—Rollover (Power Operated)
Milwaukee (Wis.) Foundry Equipment Co.

MOLYBDENUM
Climax Molybdenum Co., 500 Fifth Ave., N. Y. C.

MONEL METAL
International Nickel Co., Inc., The, 67 Wall St., N. Y. C.

MONORAIL SYSTEMS—Hand & Electric
American Monorail Co., The, Cleveland.
Cleveland Tramrail Div. of The Cleveland Crane & Engng. Co., Wickliffe, Ohio.

MOTORS—Electric
Allis-Chalmers Mfg. Co., Milwaukee.
Delco Products Div. General Motors Corp., Dayton, Ohio.
Fairbanks, Morse & Co., Chicago.
General Electric Co., Schenectady, N. Y.
Harnischfeger Corp., 4401 W. National Ave., Milwaukee.
Howell (Mich.) Electric Motors Co.
Lincoln Electric Co., Cleveland.
Reliance Electric & Engineering Co., Cleveland, Ohio.
Westinghouse Elec. & Mfg. Co., E. Ptgh.

MOTORS—Electric, Second-Hand. (See Clearing House Section)

NAILS—Wire
American Steel & Wire Co. (U. S. Steel Corp. Subsidiary), Cleveland.
Columbia Steel Co. (U. S. Steel Corp. Subsidiary), San Francisco, Calif.
Pittsburgh (Pa.) Steel Co.
Wickwire Brothers, Cortland, N. Y.
Youngstown (Ohio) Sheet & Tube Co., The

Products Index

NIBBLING MACHINES
Gray Machine Co., Philadelphia.

NIBS—Lathe & Grinder Center
McKenna Metals Co., Latrobe, Pa.

NICKEL
International Nickel Co., Inc., The, 67 Wall St., N. Y. C.

NITROGEN
Air Reduction, 60 East 42nd St., N. Y. C.

NOZZLES—Sand Blasting
Norton Co., Worcester, Mass.

NUT MACHINERY
Denison Engineering Co., The, 108 W. Chestnut St., Columbus, Ohio.

NUT MACHINERY — Automatic Cold Pressed
Waterbury (Conn.) Farrel Foundry & Machine Co., The.

NUTS—Castellated
Cleveland (Ohio) Cap Screw Co., The.
National Acme Co., The, Cleveland.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

NUTS—Lock
Elastic Stop Nut Corp., Union, N. J.
Standard Pressed Steel Co., Jenkintown, Pa.

NUTS—Machine Screw
Progressive Mfg. Co., Torrington, Conn.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

NUTS—Semi-Finished
Cleveland (Ohio) Cap Screw Co., The.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

NUTS—Special
Tinnerman Products, Inc., Cleveland, Ohio.

NUTS—Wing
Parker-Kalon Corp., 200 Varick St., N. Y. C.

OIL FILTERING SYSTEMS
Nugent, Wm. W., & Co., Inc., Chicago, Ill.

OIL & GREASE SEALS
Chicago (Ill.) Rawhide Mfg. Co., The, 1306 Elston Ave.
Garlock Packing Co., The, Palmyra, N. Y.

OIL RETAINERS
Chicago (Ill.) Rawhide Mfg. Co., The, 1306 Elston Ave.

OIL STONES
Norton Co., Worcester, Mass.

OILS—Cutting
Acheson Colloids Corp., Port Huron, Mich.
Cities Service Oil Co., 60 Wall Tower, N. Y. C.
Penola, Inc., Pittsburgh, Pa.
Shell's Industrial Lubricants Div., Shell Bldg., San Francisco, Shell Bldg., St. Louis, & 50 W. 50th St., N. Y. C.
Standard Oil Co. (Indiana), Chicago, Ill.
Sun Oil Co., Philadelphia.
Texas Company, The, 135 East 42nd St., N. Y. C.
Tide Water Associated Oil Co., 17 Battery Place, N. Y. C.

OILS—Fuel
Gulf Oil Corp., Gulf Refining Co., Pittsburgh.
Standard Oil Co. (Indiana), Chicago, Ill.
Sun Oil Co., Philadelphia.
Texas Company, The, 135 East 42nd St., N. Y. C.
Tide Water Associated Oil Co., 17 Battery Place, N. Y. C.

OILS—Lubricating
Cities Service Oil Co., 60 Wall Tower, N. Y. C.
Gulf Oil Corp., Gulf Refining Co., Pittsburgh.
Pure Oil Co., The, Chicago.
Shell's Industrial Lubricants Div., Shell Bldg., San Francisco, Shell Bldg., St. Louis, & 50 W. 50th St., N. Y. C.
Standard Oil Co. (Indiana), Chicago.
Texas Company, The, 135 East 42nd St., N. Y. C.
Tide Water Associated Oil Co., 17 Battery Place, N. Y. C.

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ORE BRIDGES
Dravo Corp., Engineering Wks. Div., Pittsburgh.

ORES—Iron
Cleveland-Cliffs Iron Co., The, Cleveland, Ohio.
Pickands Mather & Co., Cleveland.

ORES—Manganese
Cuban-American Manganese Corp., 122 East 42nd St., N. Y. C.

OVENS—Coke and By-Product Recovery
Koppers Co., Engineering & Construction Div., Pittsburgh.

OVENS—Core and Mold
Holcroft & Co., Detroit.
Mahon, R. C., Co., Detroit, Mich.

OVENS—Enameling and Japanning
Mahon, R. C., Co., Detroit, Mich.

OXY-ACETYLENE — Shape-Cutting Machines
Air Reduction, 60 East 42nd St., N. Y. C.
Linde Air Products Company, The, 30 East 42nd St., N. Y. C.

OXYGEN
Air Reduction, 60 East 42nd St., N. Y. C.
Linde Air Products Company, The, 30 East 42nd St., N. Y. C.

PACKING—Felt
American Felt Co., 315 Fourth Ave., N. Y. C.

PACKING—Leather
Chicago (Ill.) Rawhide Mfg. Co., The, 1306 Elston Ave.
Garlock Packing Co., The, Palmyra, N. Y.

PACKING—Locomotive Cylinder
Koppers Co., American Hammered Piston Ring Div., Baltimore, Md.

PACKING—Metallic
Garlock Packing Co., The, Palmyra, N. Y.

PACKING—Rubber
Manhattan Rubber Mfg. Div. of Raybestos-Manhattan Inc., The, 2 Townsend St., Passaic, N. J

PACKING—Sheet, Asbestos or Rubber
Carey, Philip, Co., The, Cincinnati, Ohio.
Garlock Packing Co., The, Palmyra, N. Y.
Hewitt Rubber Corp., Buffalo, N. Y.
Johns-Manville Corp., 22 East 40th St., New York City.

PAINT
American Asphalt Paint Co., Chicago, Ill.
Koppers Co., Tar & Chemical Div., Pittsburgh, Pa.
National Lead Co., 111 Bdway., N. Y. C.

PARALLELS
Challenge Machinery Co., Grand Haven, Mich.
Ford Motor Co. (C. E. Johansson Div.), Dearborn, Mich.

PERFORATED METAL
Chicago Perforating Co., 2440 W 24th Place, Chicago, Ill.
Erdle Perforating Co., Rochester, N. Y.
Harrington & King Perforating Co., The, Chicago.
Hendrick Mfg. Co., Carbondale, Pa.
Mundt, Chas., & Sons, 59 Fairmount Ave., Jersey City, N. J.
Wickwire Spencer Steel Co., 500 Fifth Ave., N. Y. C.

PICKLING COMPOUNDS
American Chemical Paint Co., Ambler, Pa.

PICKLING MACHINES
Aetna-Standard Engineering Co., The, Youngstown, Ohio.
Mesta Mch. Co., Pittsburgh.

PICKLING TANK LININGS
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Custodis Construction Co., Inc., 80 Broad St., New York City.
National Lead Co., 111 Bdway., N. Y. C

PICKLING TANK STEAM JETS
Durion Co., Inc., The, 438 N. Findlay St., Dayton, Ohio.

PIG IRON
Bethlehem (Pa.) Steel Company.
Brooke, E. & G., Iron Co., Birdsboro, Pa.
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Hanna Furnace Corp., The, Ecorse, Detroit, Mich.
Jackson (Ohio) Iron & Steel Co., The.
Jones & Laughlin Steel Corp., Pittsburgh.
Pickands Mather & Co., Cleveland.
Republic Steel Corp., Cleveland, Ohio.
Tennessee Coal, Iron & Railroad Co. (U. S. Steel Corp. Subsidiary), Birmingham, Ala.
Wisconsin Steel Co., Chicago, Ill.

PIG IRON CASTING PLANTS
Heyl & Patterson, Inc., Pittsburgh.

PILING—Steel Pipe
National Tube Co. (U. S. Steel Corp. Subsidiary), Pittsburgh.

PILING—Steel Sheet
American Rolling Mill Co., The, Middletown, Ohio.
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.

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Medart Co., The, St. Louis, Mo.

PINIONS
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PINIONS—Rolling Mill
Mesta Mch. Co., Pittsburgh.

PINIONS—Wire and Rod
Rathbone, A. R. & J., Palmer, Mass.

PINS—Cotter
Lamson & Sessions Co., The, Cleveland.

PIPE—Alloy
National Tube Co. (U. S. Steel Corp. Subsidiary), Pittsburgh.

PIPE—Cast Iron, B & S & Flanged
Wood, R. D., & Co., Philadelphia, Pa.

PIPE—Lead
National Lead Co., 111 Bdway., N. Y. C.

PIPE—Lead Lined
National Lead Co., 111 Bdway., N. Y. C.

PIPE—New and Second-Hand
Albert & Davidson Pipe Corp., 2nd Ave., 50-51st St., Bklyn., N. Y
Greenpoint Iron & Pipe Co., Inc., 340 Stagg St., Bklyn., N. Y.

PIPE—Seamless Brass or Copper
American Brass Co., The, Waterbury, Conn.
Revere Copper & Brass, Inc., 230 Park Ave., New York City.

PIPE—Seamless Steel
National Tube Co. (U. S. Steel Corp. Subsidiary), Pittsburgh.

PIPE—Spiral Welded
American Rolling Mill Co., The, Middletown, Ohio.

PIPE—Standard, Black and Galvanized
Bethlehem (Pa.) Steel Company.
Jones & Laughlin Steel Corp., Pittsburgh.
National Tube Co. (U. S. Steel Corp. Subsidiary), Pittsburgh.

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Ohio Machine Tool Co., Kenton, Ohio.
Sellers, William, & Co., Inc., 1620 Hamilton St., Philadelphia, Pa.

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Cleveland (Ohio) Punch & Shear Works Co., The.
Sellers, William, & Co., Inc., 1620 Hamilton St., Philadelphia, Pa.

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Cleveland (Ohio) Punch & Shear Works Co., The.
Espen-Lucas Mch. Wks., Philadelphia.

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Alan Wood Steel Co., Conshohocken, Pa.
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Inland Steel Co., Chicago.

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Alan Wood Steel Co., Conshohocken, Pa.
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Bethlehem (Pa.) Steel Company.
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Jones & Laughlin Steel Corp., Pittsburgh.
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Tennessee Coal, Iron & Railroad Co. (U. S. Steel Corp. Subsidiary), Birmingham, Ala.
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United Chromium Incorporated, 51 East 42nd St., N. Y. C.

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Cleveland (Ohio) Punch & Shear Works Co., The.
Littell, F. J., Mch. Co., Chicago.

PRESSED METAL PARTS
Budd, Edward G., Mfg. Co., Phila., Pa.
Champion Sheet Metal Co., Inc., cor. Squires & Duane Sts., Cortland, N. Y.
Davis Brake Beam Co., Laurel Ave. & A St., Johnstown, Pa.
New England Pressed Steel Co., Natick, Mass.
Stanley Works, The, New Britain, Conn.
Bridgeport, Conn.
Transue & Williams Steel Forging Corp., Alliance, Ohio.
Whitehead Stamping Co., 1669 W. Lafayette Blvd., Detroit, Mich.

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Crosby Co., The, Buffalo, N. Y.
Koch, George, Sons, Inc., Evansville, Inc.
Lansing (Mich.) Stamping Co., So. Penn Ave.
Parish Pressed Steel Co., Reading, Pa.
Stanley Works, The, New Britain, Conn.
Transue & Williams Steel Forging Corp., Alliance, Ohio.

PRESSES—Automatic
Cleveland (Ohio) Punch & Shear Works Co., The.
Niagara Mch. & Tool Wks., Buffalo, N. Y.

PRESSES—Baling
Baldwin-Southwark Div. Baldwin Locomotive Wks., Philadelphia.
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Milwaukee (Wis.) Foundry Equipment Co.

PRESSES—Broaching
Hydraulic Press Mfg. Co., The, Mt. Gilead, Ohio.
Oilgear Co., The, 1311 W. Bruce St., Milwaukee, Wis.

PRESSES—Coining
Cleveland (Ohio) Punch & Shear Works Co., The.
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Mesta Mch. Co., Pittsburgh.
Morgan Engineering Co., The, Alliance, O.

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Lake Erie Engineering Corp., 68 Kenmore Sta., Buffalo, N. Y.
Niagara Mch. & Tool Wks., Buffalo, N. Y.

PRESSES—Friction Screw
Schatz Mfg. Co., The, Poughkeepsie, N. Y.
Zeh & Hahnemann Co., Newark, N. J.

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PULLEYS—Magnetic
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RAILS
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Frank, M. K., 480 Lexington Ave., N. Y. C.
Tennessee Coal, Iron & Railroad Co. (U. S. Steel Corp. Subsidiary), Birmingham, Ala.

RAILS—Relaying
Frank, M. K., 480 Lexington Ave., N. Y. C.
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RAILWAY EQUIPMENT & SUPPLIES
Fairbanks, Morse & Co., Chicago.
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Carboloy Co., Inc., 11153 East 8-Mile Road, Detroit, Michigan.
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Gisholt Machine Co., Madison, Wisconsin.
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Tomkins-Johnson Co., The, Jackson, Mich.

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Aluminum Co. of America, Pittsburgh.

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Revere Copper & Brass, Inc., 230 Park Ave., New York City.
Titan Metal Mfg. Co., Bellefonte, Pa.

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Kidd Drawn Steel Co., Aliquippa, Pa.

RODS—Magnesium Alloys
American Magnesium Corp., 1701 Gulf Bldg., Pittsburgh.
Dow Chemical Co., The, 921 Jefferson Ave., Midland, Mich.

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RODS—Phosphor Bronze
American Brass Co., The, Waterbury, Conn.
Revere Copper & Brass, Inc., 230 Park Ave., New York City.

RODS—Rustless
Rustless Iron & Steel Corp., Baltimore, Md.

RODS—Welding
Air Reduction, 60 East 42nd St., N. Y. C.
American Brass Co., The, Waterbury, Conn.
American Steel & Wire Co. (U. S. Steel Corp. Subsidiary), Cleveland.
Harnischfeger Corp., 4401 W. National Ave., Milwaukee.
Lincoln Electric Co., The, Cleveland.
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Metal & Thermit Corp., 120 Broadway, N. Y. C.
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Revere Copper & Brass, Inc., 230 Park Ave., New York City.
Titan Metal Mfg. Co., Bellefonte, Pa.

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ROLLING MACHINERY—Cold Rolling
Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh.
United Engineering & Fdry. Co., Ptgh.

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Parker Rust Proof Co., 2186 Milwaukee Ave., Detroit.

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DoAll Saw Co. Div. of Continental Machines, Inc., Des Plaines, Ill.

SAWS—Band and Hack for Metal
Armstrong-Blum Mfg. Co., Chicago.
Atkins, E. C., & Co., 406 So. Illinois St., Indianapolis, Ind.
Continental Machines, Inc., 1311 S. Washington Ave., Minneapolis, Minn.
Disston, Henry, & Sons, Inc., Philadelphia.
DoAll Saw Co. Div. of Continental Machines, Inc., Des Plaines, Ill.

SAWS—Circular, Rip & Cutoff
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Atkins, E. C., & Co., 406 So. Illinois St., Indianapolis, Ind.
Disston, Henry, & Sons, Inc., Philadelphia.

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Tabor Mfg. Co., Philadelphia.

SAWS—Milling
Atkins, E. C., & Co., 406 So. Illinois St., Indianapolis, Ind.
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SAWS—Screw Slotting
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Erdle Perforating Co., Rochester, N. Y.
Harrington & King Perforating Co., The, Chicago.
Hendrick Mfg. Co., Carbondale, Pa.
Mundt, Chas., & Sons, 59 Fairmount Ave., Jersey City, N. J.

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Eastern Mch. Screw Corp., New Haven, Ct.
Mid-West Screw Products Co., 20 St. George St., St. Louis, Mo.
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New Britain-Gridley Machine Div., The New Britain Machine Co., New Britain, Conn.
Olson Mfg. Co., Worcester, Mass.
Ottemiller, Wm. H., Co., Inc., York, Pa.
Peck Spring Co., The, Plainville, Conn.
Shimer, Samuel J., & Sons, Inc., Milton, Pa.
Waltham (Mass.) Watch Co.

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National Acme Co., The, Cleveland.
New Britain-Gridley Machine Div., The New Britain Machine Co., New Britain, Conn.

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Warner & Swasey Co., The, Cleveland.

SCREW MACHINERY—Multiple Spindle
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Cone Automatic Machine Co., Inc., Windsor, Vt.
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Monarch Steel Co., Indianapolis, Ind.
Union Drawn Steel Div. Republic Steel Corp., Massillon, Ohio.

SCREWS—Cap
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Lamson & Sessions Co., The, Cleveland.
Mid-West Screw Products Co., 20 St. George St., St. Louis, Mo.
National Acme Co., The, Cleveland
Ottemiller, Wm. H., Co., Inc., York, Pa.
Triplex Screw Co., Cleveland.

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Lamson & Sessions Co., The, Cleveland.

SCREWS—For Sheet Metal
Parker-Kalon Corp., 200 Varick St., New York City.

SCREWS—Hardened Metallic Drive
Parker-Kalon Corp., 200 Varick St., New York City.

SCREWS—Locking
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Blake & Johnson Co., The, Waterville, Conn.
Lamson & Sessions Co., The, Cleveland.
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Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
Shimer, Samuel J., & Sons, Inc., Milton, Pa.
Triplex Screw Co., Cleveland.

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Standard Pressed Steel Co., Jenkintown, Pa.

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SCREWS—Thread Cutting
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Ohio Electric Mfg. Co., The, 5908 Maurice Ave., Cleveland.
Stearns Magnetic Mfg. Co., 635 So. 28th St., Milwaukee.

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Wisconsin Steel Co., Chicago, Ill.
Wyckoff Drawn Steel Co., Pittsburgh.

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LaSalle Steel Co., Chicago.
Union Drawn Steel Div. Republic Steel Corp., Massillon, Ohio.

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Wisconsin Steel Co., Chicago, Ill.
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Ohio Machine Tool Co., Kenton, Ohio.

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Atkins, E. C., & Co., 406 So. Illinois St., Indianapolis, Ind.
Canton Foundry & Mch. Co. Div. of The Hill Acme Co., 6400 Breakwater Ave., Cleveland, Ohio.
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Heppenstall Co., Pittsburgh, Pa.

SHEARING MACHINES—Alligator
Canton Foundry & Mch. Co. Div. of The Hill Acme Co., 6400 Breakwater Ave., Cleveland, Ohio.

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Federal Bearings Co., Inc., The, Poughkeepsie, N. Y.
Schatz Mfg. Co., The, Poughkeepsie, N. Y

SHEARING MACHINES—Bar
Buffalo (N. Y.) Forge Co., 492 Broadway.
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United Engineering & Fdry. Co., Ptgh.

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Niagara Machine & Tool Works, Buffalo, N. Y.
Schatz Mfg. Co., The, Poughkeepsie, N. Y
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V & O Press Co., Hudson, N. Y.
Waterbury (Conn.) Farrel Foundry & Machine Co., The.

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Aluminum Co. of America, Pittsburgh.

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Republic Steel Corp., Cleveland, Ohio.
Youngstown (Ohio) Sheet & Tube Co., The.

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Ryerson, Jos., T., & Son, Inc., Chicago.
Scully Steel Products Co. (U. S. Steel Corp. Subsidiary), Chicago.
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Weirton (W. Va.) Steel Co.

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Worth Steel Co., Claymont, Del.

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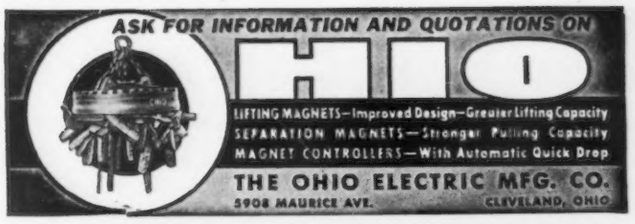
American Brass Co., The, Waterbury, Conn.
Revere Copper & Brass, Inc., 230 Park Ave., New York City.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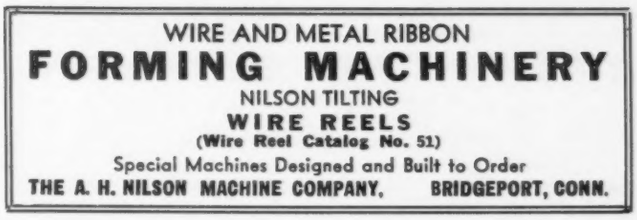
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Superior Sheet Steel Co., The, Canton, Ohio.

SHEETS—Magnesium Alloys
American Magnesium Corp., 1701 Gulf Bldg., Pittsburgh.
Dow Chemical Co., The, 921 Jefferson Ave., Midland, Mich.

SHEETS—Metal Furniture
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
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Marion (Ohio) Steam Shovel Co.

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SILICO—MANGANESE
Electro Metallurgical Sales Corp., 30 E. 42nd St., N. Y. C.

SILICON METAL & ALLOYS
Electro Metallurgical Sales Corp., 30 E. 42nd St., N. Y. C.

SINE BARS
Ford Motor Co. (C. E. Johansson Div.), Dearborn, Mich.

SLABS
Andrews Steel Co., The, Newport, Ky.

SLINGS—Wire Rope
Macwhyte Co., Kenosha, Wisc.
Roebling's, John A., Sons Co., Trenton, N. J.

SLITTERS—Gang
McKay Machine Co., The, Youngstown, Ohio.

SLOTTERS
Lobdell Car Wheel Co., Nazel Hammer Div., Wilmington, Del.

SOAKING PITS
Amsler-Morton Co., The, Pittsburgh, Pa.

SOLDER—All Kinds
Kester Solder Co., Chicago, Ill.

SOLDER—Flux-Filled
Kester Solder Co., Chicago, Ill.

SOLVENTS—Oil & Grease
Detroit Rex Products Co., Detroit, Mich.

SPECIAL MACHINERY
Baldwin-Southwark Div. Baldwin Locomotive Wks., Philadelphia.
Bullard Co., The, Bridgeport, Conn.
Coulter, James, Machine Co., The, Bridgeport, Conn.
Davis & Thompson Co., Milwaukee, Wis.
Denison Engineering Co., The, 108 W. Chestnut St., Columbus, Ohio.
Diamond Iron Works, Inc., Minneapolis, Minn.
Eastern Tool & Mfg. Co., Bloomfield, N. J.
Hartford (Conn.) Special Machinery Co., The.
Morgan Engineering Co., The, Alliance, O.
Nilson, A. H., Machine Co., Bridgeport, Conn.
Ohio Machine Tool Co., Kenton, Ohio.
Shuster, F. B., Co., The, New Haven, Conn.
Sprout, Waldron & Co., 1400 Sherman St., Muncy, Pa.
Taft-Peirce Mfg. Co., The, Woonsocket, R. I.
Torrington (Conn.) Mfg. Co., The.
Weatherly (Pa.) Foundry & Mfg. Co.
Whiting Corp., Harvey, Ill.
Wood, R. D., & Co., Philadelphia, Pa.

SPEED REDUCERS
Link-Belt Co., 2045 West Hunting Park Ave., Phila., Pa.
Poole Foundry & Mch. Co., Baltimore, Md.
Twin Disc Clutch Co., Racine, Wis.

SPIEGELEISEN
Electro Metallurgical Sales Corp., 30 E. 42nd St., N. Y. C.
New Jersey Zinc Co., The, 160 Front St., New York City.

SPIKES—Track
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Jones & Laughlin Steel Corp., Pittsburgh.

SPINDLES—Boring
Cincinnati Gilbert Machine Tool Co., The, Dayton, Ohio.

SPINDLES—Grinding
Ex-Cell-O Corp., 1210 Oakman Blvd., Detroit, Mich.

SPINDLES—Hollow Bored
American Hollow Boring Co., 1912 Raspberry St., Erie, Pa.

SPINNINGS—Aluminum
American Aluminum Ware Co., 372 Jelliff Ave., Newark, N. J.

SPLICE BARS
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.

SPRAY BOOTHS—Paint
Mahon, R. C., Co., Detroit, Mich.

SPRAY EQUIPMENT
Eclipse Air Brush Co., Inc., Newark, New Jersey.

SPRING MAKING MACHINERY
Baird Mch. Co., The, Bridgeport, Conn.
Torrington (Conn.) Mfg. Co., The.

SPRINGS—Extension, Compression, Torsion or Flat
Amer. Spring & Mfg. Corp., Holly, Mich.
American Steel & Wire Co. (U. S. Steel Corp. Subsidiary), Cleveland.
Barnes-Gibson-Raymond, Detroit Plant, Div. of Associated Spring Corp.
Barnes, Wallace Co., Div. of Associated Spring Corp., Bristol, Conn.
Cook Plant of Barnes-Gibson-Raymond, Div. of Associated Spring Corp., Ann Arbor, Mich.
Cuyahoga Spring Co., The, Cleveland.
Dunbar Bros. Co., Div. of Associated Spring Corp., Bristol, Conn.
Hubbard, M. D., Spring Co., 351 Central Ave., Pontiac, Mich.
Hunter Pressed Steel Co., Lansdale, Pa.
Lee Spring Co., Inc., 30 Main St., Brooklyn, N. Y.
Raymond Mfg. Co., Div. of Associated Spring Corp., Corry, Pa.
U. S. Steel Wire Spring Co., Cleveland, O.
Wickwire Spencer Steel Co., 500 Fifth Ave., N. Y. C.

SPROCKETS
Morse Chain Co., Ithaca, N. Y.
Whitney Chain & Mfg. Co., Hartford, Ct.

STAMPINGS—Non-Metallic
Continental-Diamond Fibre Co., Newark, Delaware.

STAMPINGS & DRAWINGS—Aluminum
American Aluminum Ware Co., 372 Jelliff Ave., Newark, N. J.

STAMPINGS OR DRAWINGS—Metal
Barnes-Gibson-Raymond, Detroit Plant, Div. of Associated Spring Corp.
Barnes, Wallace Co., Div. of Associated Spring Corp., Bristol, Conn.
Budd, Edward G., Mfg. Co., Phila., Pa.
Champion Sheet Metal Co., Inc., cor. Squires & Duane Sts., Cortland, N. Y.
Chase Brass & Copper Co., Inc., 40 Roland St., Waterbury, Conn.
Cook Plant of Barnes-Gibson-Raymond, Div. of Associated Spring Corp., Ann Arbor, Mich.
Crosby Co., The, Buffalo, N. Y.
Dunbar Bros. Co., Div. of Associated Spring Corp., Bristol, Conn.
Eastern Tool & Stpg. Co., Inc., Saugus, Mass.
Flynn, Michael, Mfg. Co., Phila., Pa.
Hubbard, M. D., Spring Co., 351 Central Ave., Pontiac, Mich.
Hunter Pressed Steel Co., Lansdale, Pa.
Lansing (Mich.) Stamping Co., So. Penn. Ave.
Lee Spring Co., Inc., 30 Main St., Brooklyn, N. Y.
Matthews Mfg. Co., 89 Hermon St., Worcester, Mass.
New England Pressed Steel Co., Natick, Mass.
Parish Pressed Steel Co., Reading, Pa.
Raymond Mfg. Co., Div. of Associated Spring Corp., Corry, Pa.
Sessions, J. H., & Son, Hooker Court, Bristol, Conn.
Shakeproof Lock Washer Co., 2525 N. Keeler Ave., Chicago.
Stanley Works, The, New Britain, Conn.
Torrington (Conn.) Company
Transue & Williams Steel Forging Corp., Alliance, Ohio.
Wagner Specialty Co., Burlington, Wisc.
Whitehead Stamping Co., 1669 W. Lafayette Blvd., Detroit, Mich.
Worcester (Mass.) Pressed Steel Co., 104 Barber Ave.
Worcester (Mass.) Stamped Metal Co., 6 Hunt St.

STAMPS—Steel Alphabets and Figures
Cunningham, M. E., Co., Pittsburgh, Pa.

STAPLES—Wire
Wickwire Brothers, Cortland, N. Y.

STEEL—Acid Resisting
Durironn Co., Inc., The, 438 N. Findlay St., Dayton, Ohio.

STEEL—Alloy
Alan Wood Steel Co., Conshohocken, Pa.
Allegheny Ludlum Steel Corp., Pittsburgh, Pa.
American Steel Export Co., 347 Madison Ave., New York City.
Andrews Steel Co., The, Newport, Ky.
Bethlehem (Pa.) Steel Company.
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Carpenter Steel Co., The, 121 W. Bern St., Reading, Pa.
Crucible Steel Co. of America, Chrysler Bldg., N. Y. C.
Harrisburg (Pa.) Steel Corp.
Ingersoll Steel & Disc Div. Borg-Warner Corp., Chicago.
Jessop Steel Co., Washington, Pa.
Republic Steel Corp., Cleveland, Ohio.
Ryerson, Jos. T., & Son, Inc., Chicago.
Tennessee Coal, Iron & Railroad Co. (U. S. Steel Corp. Subsidiary), Birmingham, Ala.
Timken Roller Bearing Co., The, Canton, O.
Timken Steel & Tube Div., The Timken Roller Bearing Co., Canton, O.
Vanadium-Alloys Steel Co., Latrobe, Pa.
Wheelock, Lovejoy & Co., Inc., Cambridge, Mass.
Youngstown (Ohio) Sheet & Tube Co. The.

STEEL—Alloy, Cold Drawn
Bliss & Laughlin, Inc., Harvey, Ill.; Buffalo, N. Y.
LaSalle Steel Co., Chicago.
Monarch Steel Co., Indianapolis, Ind.
Union Drawn Steel Div. Republic Steel Corp., Massillon, Ohio.
Wheelock, Lovejoy & Co., Inc., Cambridge, Mass.
Wyckoff Drawn Steel Co., Pittsburgh.

STEEL—Bright Finished
Bliss & Laughlin, Inc., Harvey, Ill.; Buffalo, N. Y.
LaSalle Steel Co., Chicago.
Monarch Steel Co., Indianapolis, Ind.
Union Drawn Steel Div. Republic Steel Corp., Massillon, Ohio.

STEEL—Carbon
American Steel Export Co., 347 Madison Ave., New York City.
Andrews Steel Co., The, Newport, Ky.
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Crucible Steel Co. of America, Chrysler Bldg., N. Y. C.
Ingersoll Steel & Disc Div. Borg-Warner Corp., Chicago.

STEEL—Case Hardening
Bliss & Laughlin, Inc., Harvey, Ill.; Buffalo, N. Y.
Monarch Steel Co., Indianapolis, Ind.

STEEL—Chrome
Carpenter Steel Co., The, 121 W. Bern St., Reading, Pa.

STEEL—Chrome Molybdenum
Copperweld Steel Co., Warren, Ohio.
Crucible Steel Co. of America, Chrysler Bldg., N. Y. C.

STEEL—Chrome Nickel
Copperweld Steel Co., Warren, Ohio.
Crucible Steel Co. of America, Chrysler Bldg., N. Y. C.

STEEL—Chrome Nickel Silver
Ingersoll Steel & Disc Div. Borg-Warner Corp., Chicago.

STEEL—Cobalt
Darwin & Milner, Inc., Cleveland.

STEEL—Cold Drawn
Bliss & Laughlin, Inc., Harvey, Ill.; Buffalo, N. Y.
Jones & Laughlin Steel Corp., Pittsburgh.
Kidd Drawn Steel Co., Aliquippa, Pa.
LaSalle Steel Co., Chicago.
Monarch Steel Co., Indianapolis, Ind.
Rathbone, A. B. & J., Palmer, Mass.
Ryerson, Joseph T., & Son, Inc., Chicago.
Union Drawn Steel Div. Republic Steel Corp., Massillon, Ohio.
Wyckoff Drawn Steel Co., Pittsburgh.

STEEL—Cold Rolled Strip
American Steel & Wire Co. (U. S. Steel Corp. Subsidiary), Cleveland.
Bethlehem (Pa.) Steel Company.
Griffin Mfg. Co., Erie, Pa.
Jones & Laughlin Steel Corp., Pittsburgh.
Republic Steel Corp., Cleveland, Ohio.
Ryerson, Jos. T., & Son, Inc., Chicago.
Scully Steel Products Co. (U. S. Steel Corp. Subsidiary), Chicago.
Stanley Works, The, New Britain, Conn.; Bridgeport, Conn.
Steel & Tubes Div. of Republic Steel Corp., Cleveland.
Superior Steel Corp., Carnegie, Pa.
Thomas Steel Co., The, Warren, Ohio.
Wetherell Bros. Co., Cambridge, 39, Mass.
Wisconsin Steel Co., Chicago, Ill.
Worcester (Mass.) Pressed Steel Co., 104 Barber Ave.

STEEL—Cold Rolled Strip—Electro Brass Coated
Thomas Steel Co., The, Warren, Ohio.

STEEL—Cold Rolled Strip, Electro Copper Coated
Thomas Steel Co., The, Warren, Ohio.

STEEL—Cold Rolled Strip, Electro-Galvanized Coated
Thomas Steel Co., The, Warren, Ohio.

STEEL—Cold Rolled Strip, Electro Tin Coated
Thomas Steel Co., The, Warren, Ohio.

STEEL—Cold Rolled Strip, Electro Zinc Coated
Thomas Steel Co., The, Warren, Ohio.

STEEL—Cold Rolled Strip, Stainless
Griffin Mfg. Co., Erie, Pa.

STEEL—Composite Tool & Die
Jessop Steel Co., Washington, Pa.

STEEL—Corrosion Resisting
Carpenter Steel Co., The, 121 W. Bern St., Reading, Pa.
Midvale Co., The, Nicetown, Phila., Pa.
Rustless Iron & Steel Corp., Baltimore, Md.
Superior Steel Corp., Carnegie, Pa.

STEEL—Crucible
Crucible Steel Co. of America, Chrysler Bldg., N. Y. C.
Jessop, Wm., & Sons, Inc., 627-629 Sixth Ave., N. Y. C.
Vanadium-Alloys Steel Co., Latrobe, Pa.

STEEL—Cutlery
Allegheny Ludlum Steel Corp., Pittsburgh, Pa.
Carpenter Steel Co., The, 121 W. Bern St., Reading, Pa.

STEEL—Die
Allegheny Ludlum Steel Corp., Pittsburgh, Pa.
Carpenter Steel Co., The, 121 W. Bern St., Reading, Pa.

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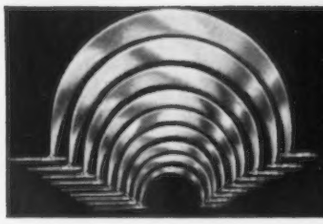

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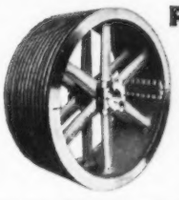

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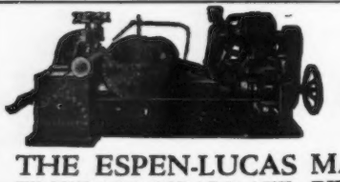
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Disston, Henry, & Sons, Inc., Philadelphia.
Jessop, Wm., & Sons, Inc., 627-29 Sixth Ave., N. Y. C.
Wheelock, Lovejoy & Co., Inc., Cambridge, Mass.

STEEL—Drill
Allegheny Ludlum Steel Corp., Pittsburgh, Pa.
Crucible Steel Co. of America, Chrysler Bldg., N. Y. C.

STEEL—Electric
Allegheny Ludlum Steel Corp., Pittsburgh, Pa.
Carpenter Steel Co., The, 121 W. Bern St., Reading, Pa.
Copperweld Steel Co., Warren, Ohio.
Crucible Steel Co. of America, Chrysler Bldg., N. Y. C.
Disston, Henry, & Sons, Inc., Philadelphia.
Timken Roller Bearing Co., The, Canton, O.
Timken Steel & Tube Div., The Timken Roller Bearing Co., Canton, O.

STEEL—High Speed
Allegheny Ludlum Steel Corp., Pittsburgh, Pa.
Carpenter Steel Co., The, 121 W. Bern St., Reading, Pa.
Cleveland (Ohio) Twist Drill Co., The.
Crucible Steel Co. of America, Chrysler Bldg., N. Y. C.
Ingersoll Steel & Disc Div. Borg-Warner Corp., Chicago.
Jessop Steel Co., Washington, Pa.
Latrobe (Pa.) Electric Steel Co.
Vanadium-Alloys Steel Co., Latrobe, Pa.

STEEL—Hot Rolled Strip
Bethlehem (Pa.) Steel Company.
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Great Lakes Steel Corp., Ecorse, Detroit.
Inland Steel Co., Chicago.
Jones & Laughlin Steel Corp., Pittsburgh.
Laclede Steel Co., St. Louis, Mo.
Republic Steel Corp., Cleveland, Ohio.
Scully Steel Products Co. (U. S. Steel Corp. Subsidiary), Chicago.
Stanley Works, The, New Britain, Conn., Bridgeport, Conn.
Steel & Tubes Div. of Republic Steel Corp., Cleveland.
Superior Steel Corp., Carnegie, Pa.

STEEL—Magnet
Carpenter Steel Co., The, 121 W. Bern St., Reading, Pa.

STEEL—Open Hearth
Andrews Steel Co., The, Newport, Ky.
Pittsburgh (Pa.) Steel Co.
Timken Roller Bearing Co., The, Canton, O.
Timken Steel & Tube Div., The Timken Roller Bearing Co., Canton, O.

STEEL—Rustless
Allegheny Ludlum Steel Corp., Pittsburgh, Pa.
Carpenter Steel Co., The, 121 W. Bern St., Reading, Pa.
Griffin Mfg. Co., Erie, Pa.
Rustless Iron & Steel Corp., Baltimore, Md.

STEEL—Screw
Bliss & Laughlin, Inc., Harvey, Ill.; Buffalo, N. Y.
Jones & Laughlin Steel Corp., Pittsburgh.
LaSalle Steel Co., Chicago.
Monarch Steel Co., Indianapolis, Ind.
Timken Roller Bearing Co., The, Canton, O.
Timken Steel & Tube Div., The Timken Roller Bearing Co., Canton, O.
Union Drawn Steel Div. Republic Steel Corp., Massillon, Ohio.
Wyckoff Drawn Steel Co., Pittsburgh.

STEEL—Special Analysis
Allegheny Ludlum Steel Corp., Pittsburgh Pa.
Andrews Steel Co., The, Newport, Ky.
Bliss & Laughlin, Inc., Harvey, Ill.; Buffalo, N. Y.
Carpenter Steel Co., The, 121 W. Bern St., Reading, Pa.
Copperweld Steel Co., Warren, Ohio.
Crucible Steel Co. of America, Chrysler Bldg., N. Y. C.
Harrisburg (Pa.) Steel Corp.
Republic Steel Corp., Cleveland, Ohio.
Timken Roller Bearing Co., The, Canton, O.
Timken Steel & Tube Div., The Timken Roller Bearing Co., Canton, O.

STEEL—Spring
Barnes-Gibson-Raymond, Detroit Plant, Div. of Associated Spring Corp.
Barnes, Wallace Co., Div. of Associated Spring Corp., Bristol, Conn.
Republic Steel Corp., Cleveland, Ohio.
Timken Roller Bearing Co., The, Canton, O.
Timken Steel & Tube Div., The Timken Roller Bearing Co., Canton, O.
Youngstown (Ohio) Sheet & Tube Co., The

STEEL-Stainless
Allegheny Ludlum Steel Corp., Pittsburgh, Pa.
American Rolling Mill Co., The, Middletown, Ohio.
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Carpenter Steel Co., The, 121 W. Bern St., Reading, Pa.
Crucible Steel Co. of America, Chrysler Bldg., N. Y. C.
Disston, Henry, & Sons, Inc., Philadelphia.
Latrobe (Pa.) Electric Steel Co.
Republic Steel Corp., Cleveland, Ohio.
Rustless Iron & Steel Corp., Baltimore, Md.
Ryerson, Jos. T., & Son, Inc., Chicago.
Scully Steel Products Co. (U. S. Steel Corp. Subsidiary), Chicago.
Union Drawn Steel Div. Republic Steel Corp., Massillon, Ohio.
Wetherell Bros. Co., Cambridge, 39, Mass.

STEEL—Stainless Clad
Ingersoll Steel & Disc Div. Borg-Warner Corp., Chicago.
Jessop Steel Co., Washington, Pa.

STEEL—Tool
Allegheny Ludlum Steel Corp., Pittsburgh, Pa.
Bethlehem (Pa.) Steel Company.
Carpenter Steel Co., The, 121 W. Bern St., Reading, Pa.
Copperweld Steel Co., Warren, Ohio.
Crucible Steel Co. of America, Chrysler Bldg., N. Y. C.
Darwin & Milner, Inc., Cleveland.
Disston, Henry, & Sons, Inc., Philadelphia.
Firth-Sterling Steel Co., McKeesport, Pa.
Ingersoll Steel & Disc Div. Borg-Warner Corp., Chicago.
Jessop Steel Co., Washington, Pa.
Jessop, Wm., & Sons, Inc., 627-629 Sixth Ave., N. Y. C.
Kidd Drawn Steel Co., Alquippa, Pa.
Midvale Co., The, Nicetown, Phila., Pa.
Ryerson, Jos., T., & Son, Inc., Chicago.
Tennessee Coal, Iron & Railroad Co. (U. S. Steel Corp. Subsidiary), Birmingham, Ala.
Vanadium-Alloys Steel Co., Latrobe, Pa.
Wheelock, Lovejoy & Co., Inc., Cambridge, Mass.

STEEL MILL EQUIPMENT
Weilman Engineering Co., The, Cleveland

STEEL PLANTS AND ROLLING MILLS
Brassert, H. A., & Co., Pittsburgh, Pa.

STEEL ROLLS
United Engineering & Fdry. Co., Ptgh.

STOKERS
Babcock & Wilcox Co., The, 85 Liberty St., N. Y. C.
Whiting Corp., Harvey, Ill.

STOPPERS—Neoprene
Rhoades, R. W., Metaline Co., Inc., Long Island City, N. Y.

STOPPERS—Rubber
Rhoades, R. W., Metaline Co., Inc., Long Island City, N. Y.

STOVES—Hot Blast
McKee, Arthur G., & Co., Cleveland.
Pennsylvania Engineering Works, New Castle, Pa.

STRAIGHT EDGES
Ford Motor Co. (C. E. Johansson Div.), Dearborn, Mich.

STRAIGHTENING AND DRAWING MACHINES—For Bars
Ajax Mfg. Co., The, Cleveland.

STRAIGHTENING MACHINES—Bar & Tube
Aetna-Standard Engineering Co., The, Youngstown, Ohio.
Medart Co., The, St. Louis, Mo.

STRAIGHTENING MACHINES—Wire
Lewis Machine Co., 3455 E. 76th St., Cleveland.
Shuster, F. B., Co., The, New Haven, Conn.

STRUCTURAL IRON AND STEEL WORK
American Bridge Co. (U. S. Steel Corp. Subsidiary), Pittsburgh.
Bethlehem (Pa.) Steel Company.
Mahon, R. C., Co., Detroit, Mich.
Morgan Engineering Co., The, Alliance, O.

STRUCTURAL STEEL — See Angles, Beams, Channels and Tees

STUDS
Erie (Pa.) Bolt & Nut Co.

SUMPS—Roof
Mahon, R. C., Co., Detroit, Mich.

SUPERHEATERS
Babcock & Wilcox Co., The, 85 Liberty St., N. Y. C.

SWAGING MACHINES
Torrington (Conn.) Company.

SWITCHES—Electric
Westinghouse Elec. & Mfg. Co., East Ptgh.

TANK LININGS
Cellcote Co., The, Cleveland, Ohio.
Pennsylvania Salt Mfg. Co., Philadelphia, Pa.

TANK LININGS—Rubber
Manhattan Rubber Mfg. Div. of Raybestos-Manhattan Inc., The, 2 Townsend St., Passaic, N. J.

TANKS—Alkali Cleaning
Detroit Rex Products Co., Detroit, Mich.

TANKS—Compressed Air, Gas, Oil and Water
Westinghouse Air Brake Co., Industrial Div., Pittsburgh.

TANKS—Fuel
Stoiner Steel Products Corp., Milwaukee, Wis.

TANKS—Iron and Steel
Kirk & Blum Mfg. Co., The, Cincinnati, Ohio.
Koppers Co., Bartlett Hayward Div., Baltimore, Md.

TANKS—Pickling
Blaw-Knox Div. of Blaw-Knox Co., Blawnox, Pa.
Custodis Construction Co., Inc., 80 Broad St., New York City.
Hauser-Stander Tank Co., Cincinnati, Ohio.
Haveg Corp., Newark, Delaware.
Manhattan Rubber Mfg. Div. of Raybestos-Manhattan Inc., The, 2 Townsend St., Passaic, N. J.
Pennsylvania Salt Mfg. Co., Philadelphia, Pa.

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TANKS—Rubber Lined
Blaw-Knox Div. of Blaw-Knox Co., Blawnox, Pa.
Manhattan Rubber Mfg. Div. of Raybestos-Manhattan Inc., The, 2 Townsend St., Passaic, N. J.

TANKS—Welded
Blaw-Knox Div. of Blaw-Knox Co., Blawnox, Pa.
National Tube Co. (U. S. Steel Corp. Subsidiary), Pittsburgh.

TAPPING MACHINES
Hill Acme Co., The, Cleveland, Ohio.
Waterbury (Conn.) Farrel Fdry. & Mch. Co.

TAPS—Collapsing
Geometric Tool Co., The, New Haven, Conn.
Landis Mach. Co., Inc., Waynesboro, Pa.
Murchey Machine & Tool Co., Detroit.
National Acme Co., The, Cleveland.

TAPS AND DIES
Greenfield (Mass.) Tap & Die Corp.
Landis Mch. Co., Inc., Waynesboro, Pa.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Pratt & Whitney Div. Niles-Bement-Pond Co., West Hartford, Conn.
Victor Machinery Exchange, 251 Centre St., N. Y. C.

TEES—See Angles, Beams, Channels and Tees

TERMINALS—Plain & Lock
Shakeproof Lock Washer Co., 2525 N. Keeler Ave., Chicago.
Thompson-Bremer & Co., 1640 W. Hubbard St., Chicago.

TERNE PLATES
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.

TESTING MACHINES—Hardness
Shore Instrument & Mfg. Co., Inc., The, Jamaica, L. I., N. Y.

TESTING MACHINES—Materials
Baldwin-Southwark Div. Baldwin Locomotive Wks., Philadelphia.

THERMOCOUPLES
Wheelco Instruments Co., Chicago, Ill.

THERMOMETERS—Recording
Brown Instrument Co., The, Philadelphia, Pa.
Leeds & Northrup Co., 4956 Stenton Ave., Philadelphia.

THREAD CUTTING TOOLS—See Dies, Taps

THREAD ROLLING MACHINES
Nilson, A. H., Mach. Co., Bridgeport, Ct.
Waterbury (Ct.) Farrel Fdry. & Mch. Co., The.

THREADING MACHINES
Eastern Mesh. Screw Corp., New Haven, Conn.
Geometric Tool Co., The, New Haven, Conn.
Hill Acme Co., The, Cleveland, Ohio.
Landis Mch. Co., Inc., Waynesboro, Pa.
Murchey Machine & Tool Co., Detroit.

THREADING MACHINES—Automatic
Landis Mch. Co., Inc., Waynesboro, Pa.

THREADS—Ground
Hartford (Conn.) Special Machinery Co., The.

TIE PLATES
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Jones & Laughlin Steel Corp., Pittsburgh.

TIN PLATE
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Granite City (Ill.) Steel Co.
Inland Steel Co., Chicago.
Jones & Laughlin Steel Corp., Pittsburgh.
Republic Steel Corp., Cleveland, Ohio.
Weirton (W. Va.) Steel Co.
Wheeling (W. Va.) Steel Corp.
Youngstown (Ohio) Sheet & Tube Co., The.

TIN PLATE MACHINERY
Aetna-Standard Engineering Co., The, Youngstown, Ohio.
Wean Engineering Co., Inc., The, Warren, Ohio.

TINNING EQUIPMENT—Sheets
Wean Engineering Co., Inc., The, Warren, Ohio.

TIPS—Spot Welding
Mallory, P. R., & Co., Inc., Indianapolis, Ind.

TONGS—Automatic
Heppenstall Co., Pittsburgh, Pa.

TOOL BIT TIPS—Hard Carbide
Carboloy Co., Inc., 11153 East 8-Mile Rd., Detroit, Mich.
McKenna Metals Co., Latrobe, Pa.

TOOL BITS
Carboloy Co., Inc., 11153 East 8-Mile Road, Detroit.
Gairing Tool Co., The, Detroit.
Gisholt Machine Co., Madison, Wisconsin.

TOOL HOLDERS
Armstrong Bros. Tool Co., Chicago.
Gairing Tool Co., The, Detroit.
Gisholt Machine Co., Madison, Wisconsin.
Jones & Lamson Machine Co., Springfield, Vt.
Williams, J. H., & Co., Buffalo, N. Y.

TOOLS—Hard Carbide Tipped
McKenna Metals Co., Latrobe, Pa.

TOOLS—Lathe
Armstrong Bros. Tool Co., Chicago.
Carboloy Co., Inc., 11153 East 8-Mile Road, Detroit.
Gisholt Machine Co., Madison, Wisconsin.
Jones & Lamson Machine Co., Springfield, Vt.

TOOLS—Metal Cutting
Carboloy Co., Inc., 11153 East 8-Mile Road, Detroit.
Greenfield (Mass.) Tap & Die Corp.
Michigan Tool Co., Detroit, Mich.
National Broach & Machine Co., Detroit, Mich.
Pratt & Whitney Div. Niles-Bement-Pond Co., West Hartford, Conn.

TOOLS—Special
Ex-Cell-O Corp., 1210 Oakman Blvd., Detroit, Mich.
National Broach & Machine Co., Detroit, Mich.

TOOLS—Steel Cutting
Carboloy Co., Inc., 11153 East 8-Mile Rd., Detroit, Mich.
McKenna Metals Co., Latrobe, Pa.

TOOLS—Tungsten Carbide
Carboloy Co., Inc., 11153 East 8-Mile Road, Detroit.

TORCHES—Brazing, Cutting and Welding
Air Reduction, 60 East 42nd St., N. Y. C.
Linde Air Products Company, The, 30 East 42nd St., N. Y. C.
Weldit Acetylene Co., Detroit, Mich.

TORQUE CONVERTERS
Twin Disc Clutch Co., Racine, Wis.

TRACTORS AND TRAILERS — See Trucks, Tractors and Trailers — Industrial

TRAILERS — Industrial — See Trucks, Tractors and Trailers—Industrial

TRAMRAILS—Overhead Systems
Cleveland Tramrail Div. of The Cleveland Crane & Engng. Co., Wickliffe, Ohio.
Harnischfeger Corp., 4401 W. National Ave., Milwaukee.

TRAMWAYS—Wire Rope
Leschen, A., & Sons Rope Co., St. Louis, Mo.
Macwhyte Co., Kenosha, Wisc.

TRANSMISSIONS—Hydraulic
American Engineering Co., Philadelphia.
Oilgear Co., The, 1311 W. Bruce St., Milwaukee.

TRANSMISSIONS—Variable Speed
Continental Machines, Inc., 1311 S. Washington Ave., Minneapolis, Minn.
Link-Belt Co., 2045 West Hunting Park Ave., Phila., Pa.
Reeves Pulley Co., Columbus, Indiana.

TRAPS—Steam
Crane Co., Chicago, Ill.
Nicholson, W. H., & Co., 165 Oregon St., Wilkes-Barre, Pa.

TREADS—Safety
Blaw-Knox Div. of Blaw-Knox Co., Blawnox, Pa.
Hendrick Mfg. Co., Carbondale, Pa.
Norton Co., Worcester, Mass.

TROLLEYS
Cleveland Tramrail Div. of The Cleveland Crane & Engng. Co., Wickliffe, Ohio.

TRUCKS—Dump, Industrial
Atlas Car & Mfg. Co., The, Cleveland, Ohio.
Clark Tructractor Div. Clark Equipment Co., Battle Creek, Mich.

TRUCKS—Elevating (Power)
Atlas Car & Mfg. Co., The, Cleveland, Ohio.
Baker-Raulang Co., The, 2175 W. 25th St., Cleveland.
Clark Tructractor Div. Clark Equipment Co., Battle Creek, Mich.
Elwell-Parker Electric Co., The, Cleveland.
Yale & Towne Mfg. Co., The, Phila. Div., Phila., Pa.

TRUCKS—Foundry Core
Chicago (Ill.) Mfg. & Distributing Co.

TRUCKS—Lift (Hand & Foot)
Yale & Towne Mfg. Co., The, Phila. Div., Phila., Pa.

TRUCKS, TRACTORS AND TRAILERS—Industrial
Baker-Raulang Co., The, 2175 W. 25 St., Cleveland.
Clark Tructractor Div. Clark Equipment Co., Battle Creek, Mich.
Elwell-Parker Electric Co., The, Cleveland.
Yale & Towne Mfg. Co., The, Phila., Div., Phila., Pa.

TUBE GRINDING & POLISHING
Monarch Steel Co., Indianapolis, Ind.

TUBE MILL MACHINERY
Aetna-Standard Engineering Co., The, Youngstown, Ohio.
Taylor-Wilson Mfg. Co., McKees Rocks, Pa.
United Engineering & Fdry. Co., Ptgh.
Waterbury (Conn.) Farrel Foundry & Machine Co., The.

TUBE MILL MACHINERY—Welded
McKay Machine Co., The, Youngstown, Ohio.

TUBES—Boiler
Jones & Laughlin Steel Corp., Pittsburgh.
National Tube Co. (U. S. Steel Corp. Subsidiary), Pittsburgh.
Pittsburgh (Pa.) Steel Co.
Steel & Tubes Div. of Republic Steel Corp., Cleveland.

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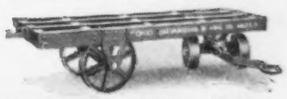

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See our Adv. Page 318, Jan. 4, Iron Age

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TUBES—Centrifugally Cast, Stainless
Duraloy Co., The, Scottdale, Pa.
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American Brass Co., The, Waterbury, Conn.
TUBES—High Carbon
Steel & Tubes Div. of Republic Steel Corp., Cleveland.
TUBES—Nickel Silver
American Brass Co., The, Waterbury, Conn.
Revere Copper & Brass, Inc., 230 Park Ave., New York City.
TUBES—Stainless Steel
National Tube Co. (U. S. Steel Corp. Subsidiary), Pittsburgh.
Ryerson, Jos., T., & Son, Inc., Chicago.
Steel & Tubes Div. of Republic Steel Corp., Cleveland.
TUBING—Aluminum Seamless
Aluminum Co. of America, Pittsburgh.
TUBING—Magnesium Alloys
American Magnesium Corp., 1701 Gulf Bldg., Pittsburgh.
Dow Chemical Co., The, 921 Jefferson Ave., Midland, Mich.
TUBING—Nichrome
Steel & Tubes Div. of Republic Steel Corp., Cleveland.
TUBING—Open Seam
Michigan Steel Tube Products Co., Detroit, Mich.
Steel & Tubes Div. of Republic Steel Corp., Cleveland.
TUBING—Phosphor Bronze
American Brass Co., The, Waterbury, Conn.
Revere Copper & Brass, Inc., 230 Park Ave., New York City.
TUBING—Seamless Steel
Jones & Laughlin Steel Corp., Pittsburgh.
National Tube Co. (U. S. Steel Corp. Subsidiary), Pittsburgh.
Ohio Seamless Tube Co., The, Shelby, Ohio.
Pittsburgh (Pa.) Steel Co.
Ryerson, Jos. T., & Son, Inc., Chicago.
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National Tube Co. (U. S. Steel Corp. Subsidiary), Pittsburgh.
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Steel & Tubes Div. of Republic Steel Corp., Cleveland.
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Michigan Steel Tube Products Co., Detroit, Mich.
National Tube Co. (U. S. Steel Corp. Subsidiary), Pittsburgh.
Ohio Seamless Tube Co., The, Shelby, Ohio.
Standard Tube Co., The, Detroit, Mich.
Steel & Tubes Div. of Republic Steel Corp., Cleveland.
Youngstown (Ohio) Sheet & Tube Co., The.
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Michigan Steel Tube Products Co., Detroit, Mich.
National Tube Co. (U. S. Steel Corp. Subsidiary), Pittsburgh.
Steel & Tubes Div. of Republic Steel Corp., Cleveland.
Swan Engineering Co., Inc., Newark, N. J.
TUMBLING BARRELS—See Barrels—Tumbling
TUNGSTEN METAL & ALLOYS
Electro Metallurgical Sales Corp., 30 E. 42nd St., N. Y. C.
Mallory, P. R., & Co., Inc., Indianapolis, Ind.
TUNGSTEN CARBIDE
Carboloy Co., Inc., 11153 East 8-Mile Road, Detroit.
Firth-Sterling Steel Co., McKeesport, Pa.
TURBINE-GENERATORS—Steam
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.
TURNING MACHINES—Bar & Tube
Medart Co., The, St. Louis, Mo.
TURNTABLES
American Bridge Co. (U. S. Steel Corp. Subsidiary), Pittsburgh.
Atlas Car & Mfg. Co., The, Cleveland, Ohio.
TURNTABLES—Industrial
Atlas Car & Mfg. Co., The, Cleveland, Ohio.
Canton Foundry & Mch. Co. Div. of The Hill Acme Co., 6400 Breakwater Ave., Cleveland, Ohio.
Whiting Corp., Harvey, Ill.
TWIST DRILLS
Cleveland (Ohio) Twist Drill Co., The.
Greenfield (Mass.) Tap & Die Corp.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Victor Machinery Exchange, 251 Centre St., N. Y. C.
UNCOILERS—Processing
Cleveland (Ohio) Punch & Shear Works Co., The.
McKay Machine Co., The, Youngstown, Ohio.
UNIONS
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UNIT HEATERS—Electric
American Foundry Equipment Co., The, 510 S. Byrkit St., Mishawaka, Ind.

VALVES—Acid Resisting
Crane Co., Chicago, Ill.
Duriron Co., Inc., The, 438 N. Findlay St., Dayton, Ohio.
National Lead Co., 111 Bdway., N. Y. C.
VALVES—Air Blast for Presses
Littell, F. J., Mch. Co., Chicago.
VALVES—Air & Hydraulic Control
Brown Instrument Co., The, Philadelphia, Pa.
Crane Co., Chicago, Ill.
Hannifin Mfg. Co., Chicago, Ill.
Nicholson, W. H., & Co., 165 Oregon St., Wilkes-Barre, Pa.
Tomkins-Johnson Co., The, Jackson, Mich.
Westinghouse Air Brake Co., Industrial Div., Pittsburgh.
VALVES—Blow Air
Chicago (Ill.) Mfg. & Distributing Co.
VALVES—Gas, Water and Steam
Brown Instrument Co., The, Philadelphia, Pa.
Crane Co., Chicago.
Jarecki Mfg. Co., Erie, Pa.
Koppers Co., Bartlett Hayward Div., Baltimore, Md.
Wood, R. D., & Co., Philadelphia, Pa.
VALVES—Hydraulic
Baldwin-Southwark Div. Baldwin Locomotive Wks., Philadelphia.
Crane Co., Chicago.
Oilgear Co., The, 1311 W. Bruce St., Milwaukee, Wis.
Wood, R. D., & Co., Philadelphia, Pa.
VALVES—Proportioning
Brown Instrument Co., The, Philadelphia, Pa.
VALVES—Pump, Rubber
Garlock Packing Co., The, Palmyra, N. Y.
VALVES—Sight Feed
Nugent, Wm. W., & Co., Inc., Chicago, Ill.
VANADIUM
Electro Metallurgical Sales Corp., 30 E. 42nd St., N. Y. C.
VARNISHES
American Asphalt Paint Co., Chicago, Ill.
VIBRATORS
Milwaukee (Wis.) Foundry Equipment Co.
VISES
Cincinnati (Ohio) Milling Mch. Co., The.
Jarecki Mfg. Co., Erie, Pa.
WASHERS—Bevel Steel
Nicetown Plate Washer Co., Inc., Philadelphia.
WASHERS—Iron or Steel
Nicetown Plate Washer Co., Inc., Philadelphia.
Sessions, J. H., & Son, Hooker Court, Bristol, Conn.
Shakeproof Lock Washer Co., 2525 N. Keeler Ave., Chicago.
Smith, Thomas, Co., Worcester, Mass.
Thompson-Bremer & Co., 1640 W. Hubbard St., Chicago, Ill.
WASHERS—Leather
Chicago (Ill.) Rawhide Mfg. Co., The, 1306 Elston Ave.
WASHERS—Lock
American Nut & Bolt Fastener Co., Pittsburgh.
Beall Tool Co., East Alton, Ill.
Butcher & Hart Mfg. Co., Toledo, Ohio.
Eaton Mfg. Co., Massillon, Ohio.
Kantlink Spring Washers, 616 Wrigley Bldg., Chicago, Ill.
National Lock Washer Co., The, Newark, N. J., and Milwaukee, Wis.
Philadelphia Steel & Wire Corp., Germantown, Philadelphia, Pa.
Positive Lock Washer Co., The, Newark, N. J.
Shakeproof Lock Washer Co., 2525 N. Keeler Ave., Chicago.
Thompson-Bremer & Co., 1640 W. Hubbard St., Chicago.
Washburn Co., The, Worcester, Mass.
WASHERS—Special
Thompson-Bremer & Co., 1640 W. Hubbard St., Chicago, Ill.
WASHERS—Spring
American Nut & Bolt Fastener Co., Pittsburgh.
Beall Tool Co., East Alton, Ill.
Butcher & Hart Mfg. Co., Toledo, Ohio.
Eaton Mfg. Co., Massillon, Ohio.
Hubbard, M. D., Spring Co., 351 Centre Ave., Pontiac, Mich.
Kantlink Spring Washers, 616 Wrigley Bldg., Chicago, Ill.
National Lock Washer Co., The, Newark, N. J., and Milwaukee, Wis.
Philadelphia Steel & Wire Corp., Germantown, Philadelphia, Pa.
Positive Lock Washer Co., The, Newark, N. J.
Shakeproof Lock Washer Co., 2525 N. Keeler Ave., Chicago.
Thompson-Bremer & Co., 1640 W. Hubbard St., Chicago, Ill.
Washburn Co., The, Worcester, Mass.
WASHING MACHINES—Industrial
Mahon, R. C., Co., Detroit, Mich.
WELDED STEEL MACHINE FRAMES
Koch, George, Sons, Inc., Evansville, Ind.
Mahon, R. C., Co., Detroit, Mich.
WELDER CONTROL—For Spot, Butt & Projection Welding Machines
Electric Controller & Mfg. Co., The, Cleveland.
WELDING
Frick Co., Inc., Waynesboro, Pa.
Morrison Metalweld Process, Inc., 1436 Bailey Ave., Buffalo, N. Y.
White Welding & Engineering Works, Worcester, Mass.

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WELDING—Electric
Federal Machine & Welder Co., Warren, Ohio.
Hobart Bros., Troy, Ohio.
Lincoln Electric Co., The, Cleveland.
Westinghouse Elec. & Mfg. Co., East Ptgh.

WELDING—Thermit
Metal & Thermit Corp., 120 Broadway, N. Y. C.

WELDING CONTACTORS
Clark Controller Co., The, Cleveland.

WELDING AND CUTTING MACHINES AND EQUIPMENT—Oxy-Acetylene
Air Reduction, 60 East 42nd St., N. Y. C.
Linde Air Products Company, The, 30 East 42nd St., N. Y. C.
Weldit Acetylene Co., Detroit, Mich.

WELDING FIXTURES
Harnischfeger Corp., 4401 W. National Ave., Milwaukee

WELDING MACHINES—Butt
Federal Machine & Welder Co., Warren, Ohio.
Swift Electric Welder Co., Detroit.
Taylor-Winfield Corp., The, Warren, Ohio.

WELDING MACHINES—Electric Arc
General Electric Co., Schenectady, N. Y.
Harnischfeger Corp., 4401 W. National Ave., Milwaukee, Wis.
Hobart Bros., Troy, Ohio.
Lincoln Electric Co., The, Cleveland.
Westinghouse Elec. & Mfg. Co., East Ptgh.

WELDING MACHINES—Electric Arc, Second-Hand. (See Clearing House Section)

WELDING MACHINES—Flash
Federal Machine & Welder Co., Warren, Ohio.
Swift Electric Welder Co., Detroit.
Taylor-Winfield Corp., The, Warren, Ohio.

WELDING MACHINES—Press
Federal Machine & Welder Co., Warren, Ohio.
Taylor-Winfield Corp., The, Warren, Ohio.

WELDING MACHINES—Resistance
Federal Machine & Welder Co., Warren, Ohio.
Taylor-Winfield Corp., The, Warren, Ohio.

WELDING MACHINES—Seam
Federal Machine & Welder Co., Warren, Ohio.
Taylor-Winfield Corp., The, Warren, Ohio.

WELDING MACHINES—Spot
Federal Machine & Welder Co., Warren, Ohio.
Swift Electric Welder Co., Detroit.
Taylor-Winfield Corp., The, Warren, Ohio.

WHEELS—Rolled Steel
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Standard Steel Wks. Div. The Baldwin Locomotive Works, Phila., Pa.

WHEELS—Seam Welding
Mallory, P. R., & Co., Inc., Indianapolis, Ind.

WIRE—Aluminum
Aluminum Co. of America, Pittsburgh.

WIRE—Barb
Pittsburgh (Pa.) Steel Co.

WIRE—Brass, Bronze, Copper, Nickel Silver or Phosphor Bronze
American Brass Co., The, Waterbury, Conn.
Revere Copper & Brass, Inc., 230 Park Ave., New York City.

WIRE—Flat, Round, Square or Special Shapes
American Steel & Wire Co. (U. S. Steel Corp. Subsidiary), Cleveland.
Barnes, Wallace Co., Div. of Associated Spring Corp., Bristol, Conn.
Laclede Steel Co., St. Louis, Mo.
Roebling's, John A., Sons Co., Trenton, N. J.
Seneca Wire & Mfg. Co., The, Fostoria, Ohio.
Wickwire Bros., Cortland, N. Y.
Wickwire Spencer Steel Co., 500 Fifth Ave., N. Y. C.

WIRE—Insulated
American Steel & Wire Co. (U. S. Steel Corp. Subsidiary), Cleveland.
General Electric Co., Schenectady, N. Y.
Roebling's, John A., Sons Co., Trenton, N. J.

WIRE—Mattress
Roebling's, John A., Sons Co., Trenton, N. J.

WIRE—Netting
Ludlow-Saylor Wire Co., St. Louis, Mo.
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WIRE—Piano and Music
Webb Wire Works, New Brunswick, N. J.
Wickwire Spencer Steel Co., 500 Fifth Ave., N. Y. C.

WIRE—Rustless
Rustless Iron & Steel Corp., Baltimore, Md.

WIRE—Special Drawn Shapes
Rathbone, A. B. & J., Palmer, Mass.

WIRE—Spring
American Steel & Wire Co. (U. S. Steel Corp. Subsidiary), Cleveland.
Barnes, Wallace Co., Div. of Associated Spring Corp., Bristol, Conn.
Columbia Steel Co. (U. S. Steel Corp. Subsidiary), San Francisco, Calif.
Jones & Laughlin Steel Corp., Pittsburgh, Pittsburgh (Pa.) Steel Co.
Roebling, John A., Sons Co., Trenton, N. J.
Seneca Wire & Mfg. Co., The, Fostoria, Ohio.

WIRE—Spring (Music)
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Air Reduction, 60 East 42nd St., N. Y. C.
American Steel & Wire Co. (U. S. Steel Corp. Subsidiary), Cleveland.
Lincoln Electric Co., The, Cleveland.
Maurath, Inc., 7400 Union Ave., Cleveland.
Metal & Thermit Corp., 120 Broadway, N. Y. C.
Pittsburgh (Pa.) Steel Co.
Revere Copper & Brass, Inc., 230 Park Ave., New York City.
Roebling's, John A., Sons Co., Trenton, N. J.
Seneca Wire & Mfg. Co., The, Fostoria, Ohio.
Wickwire Brothers, Cortland, N. Y.
Wickwire Spencer Steel Co., 500 Fifth Ave., N. Y. C.

WIRE—Zinc
Platt Bros. & Co., The, Waterbury, Conn.

WIRE CLOTH
Buffalo (N. Y.) Wire Wks. Co., Inc.
Ludlow-Saylor Wire Co., St. Louis, Mo.
Roebling's, John A., Sons Co., Trenton, N. J.
Wickwire Bros., Cortland, N. Y.
Wickwire Spencer Steel Co., 500 Fifth Ave., N. Y. C.

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WIRE DRAWING, STRAIGHTENING & CUTTING MACHINERY
Ajax Mfg. Co., The, Cleveland.

WIRE FORMING MACHINERY
Ajax Mfg. Co., The, Cleveland.
Baird Mch. Co., The, Bridgeport, Conn.
Nilson, A. H., Mach. Co., Bridgeport, Ct.
Torrington (Conn.) Mfg. Co., The.

WIRE MILL MACHINERY AND EQUIPMENT
Lewis Machine Co., The, 3455 E. 76th St., Cleveland, Ohio.
Morgan Construction Co., Worcester, Mass.
Shuster, F. B., Co., The, New Haven, Conn.
Waterbury (Ct.) Farrel Fdry. & Mach. Co., The.

WIRE PRODUCTS
American Spring & Mfg. Corp., Holly, Mich.
American Steel & Wire Co. (U. S. Steel Corp. Subsidiary), Cleveland.
Buffalo (N. Y.) Wire Wks. Co., Inc.
Eastern Tool & Mfg. Co., Bloomfield, N. J.
Hindley Mfg. Co., Valley Falls, R. I.
Hubbard, M. D., Spring Co., 351 Central Ave., Pontiac, Mich.
Jones & Laughlin Steel Corp., Pittsburgh.
Pittsburgh (Pa.) Steel Co.
U. S. Steel Wire Spring Co., Cleveland, O.
Wickwire Bros., Cortland, N. Y.
Wickwire Spencer Steel Co., 500 Fifth Ave., N. Y. C.

WIRE PRODUCTS—Formed Wire
American Spring & Mfg. Corp., Holly, Mich.
Cuyahoga Spring Co., The, Cleveland.
Eastern Tool & Mfg. Co., Bloomfield, N. J.
Jeschke Wire & Specialty Co., 315 Industrial Ave., Crawfordsville, Ind.
Lee Spring Co., Inc., 30 Main St., Brooklyn, N. Y.
Roebling's, John A., Sons Co., Trenton, N. J.

WIRE ROPE
American Steel & Wire Co. (U. S. Steel Corp. Subsidiary), Cleveland.
Bethlehem (Pa.) Steel Company.
Columbia Steel Co. (U. S. Steel Corp. Subsidiary), San Francisco, Calif.
Jones & Laughlin Steel Corp., Pittsburgh.
Leschen, A., & Sons Rope Co., St. Louis, Mo.
Macwhyte Co., Kenosha, Wisc.
Roebling's, John A., Sons Co., Trenton, N. J.
Wickwire Spencer Steel Co., 500 Fifth Ave., N. Y. C.

WIRE ROPE FITTINGS
Macwhyte Co., Kenosha, Wisc.
Roebling's, John A., Sons Co., Trenton, N. J.

WIRE STRAIGHTENING AND CUTTING MACHINERY—Automatic
Lewis Machine Co., The, 3455 E. 76th St., Cleveland.
Shuster, F. B., Co., The, New Haven, Ct.

WRENCHES
Armstrong Bros. Tool Co., Chicago.
Williams, J. H., & Co., Buffalo, N. Y.

WRENCHES—Pipe
Greenfield (Mass.) Tap & Die Corp.
Ushco Mfg. Co., Inc., 135 Tonawanda St., Buffalo, N. Y.

ZINC—Rolled
New Jersey Zinc Co., The, 160 Front St., New York City.

ZINC—SLAB (Spelter)
New Jersey Zinc Co., The, 160 Front St., N. Y. C.

ZINC—Strip
New Jersey Zinc Co., The, 160 Front St., New York City.
Platt Bros. & Co., The, Waterbury, Conn.

ZIRCONIUM METAL & ALLOYS
Electro Metallurgical Sales Corp., 30 E. 42nd St., N. Y. C.

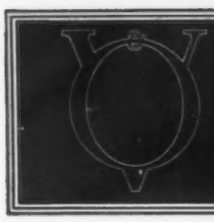
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Fig. 1434 Pats. Pend'g
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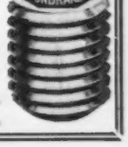
Fig. 232

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245 cu. ft. 10"x10" Ingersoll-Rand Class ER1, Motor Driven
368 cu. ft. 12"x10" Ingersoll-Rand Class ER1, Motor Driven
528 cu. ft. 14"x12" Ingersoll-Rand Type ER1, Motor Driven

BENDING ROLL
20' Niles, Motor Driven. Capacity 5/8"

BORING MILL—HORIZONTAL
7" Bar, Detrick & Harvey, Motor Driven. Power feed in all directions

BORING MILLS—VERTICAL
52" King, M.D. Equipped with Two Plain Rail Heads. Power Rapid Traverse in all directions
72" Gisholt, Motor Driven
90" Pond, Motor Driven

BRAKE—LEAF TYPE
6' Dreis & Krump "Chicago" No. 167, Motor Driven. Capacity 3/8"

BRAKES—PRESS TYPE
10' Loy & Nawrath, No. 610, M.D. Capacity 3/8"
8'6" Loy & Nawrath, M.D. Capacity #10 Gauge
10' Geo. A. Ohl, M.D. Capacity #10 Gauge

BULLDOZERS
No. 7 Ajax, Motor Driven. Face of Crosshead 12"x76". Stroke 16"
No. 7 Williams & White, Motor Driven. Face of Crosshead 16"x70". Stroke 22"
No. 29U Williams & White, Arr. for M.D. Face of Crosshead 36"x20"x108". Stroke 28"

CRANES—OVERHEAD ELECTRIC TRAVELING

5 ton Bedford	35'6"	Span.	220/3/60 A.C.
5 ton Reliance	44'2"	Span.	230 Volt D.C.
10 ton Whiting	40'	Span.	220 Volt D.C.
10 ton Northern	49'	Span.	220 Volt D.C.
10 ton Alliance	60'	Span.	220 Volt D.C.
10 ton Champion	85'11"	Span.	440/3/60 A.C.
15 ton Morgan	60'	Span.	220 Volt D.C.
20 ton Morgan	50'	Span.	220 Volt D.C. 5 ton Auxiliary
20 ton Whiting	60'	Span.	220 Volt D.C.
20 ton Morgan	62'	Span.	230 Volt D.C. 10 ton Auxiliary
30 ton Whiting	75'	Span.	220 Volt D.C.

DIEING MACHINE
25 ton Henry & Wright

FORGING MACHINES
¾" to 7" Ajax, National, Acme, Steel Frame

FURNACES
3 ton Pittsburgh Electric Steel Melting Furnace. Complete with Transformers
9000 lb. Swindell Electric Melting Furnace. Complete with 1800 KVA 22,000/3/60 Transformers
10 T. No. 5 Heroult Slag Melting Furnace. Complete with 7500 KVA 11,000/3/60 Transformers (New)

GEAR REDUCTION UNITS
500 HP Falk Double Reduction Gear Drive 18.6 to 1 Gear Ratio. 646 to 35 RPM
700 HP United Engr. & Fdry. Co. Gear Reduction
1500 HP Mesta Gear Reduction 9.75 to 1 Gear Ratio. Complete with 1500 HP General Electric Motor 4600 Volt, 3 Phase, 60 Cycle, 300 RPM
1500 HP Falk Gear Reduction. High Speed Shaft 234 RPM, Low Speed Shaft 26 RPM. Complete with 1500 HP Allis Chalmers Motor 2200 Volt, 3 Phase, 60 Cycle

HAMMERS — BOARD DROP — STEAM DROP — STEAM FORGING
1000 lb. to 8000 lb. Chambersburg, Billings & Spencer, Erie, Niles-Bement-Pond, Morgan

JOGGLING MACHINE
No. 2 Morgan Plate Joggling Machine. M.D. Capacity to joggle 5/8" Plate 42" from edge

LATHE
New Haven Lathe, Motor Driven. 21' Between Centers, 72" Swing, with 10" Raising Block

LATHES—AXLE
31"x13'6" Putnam Heavy Duty, Motor Drive. 102" Distance Between Centers
No. 3 N-B-P Double Axle Lathe, Heavy Duty, Motor Drive. 111" Distance Between Centers

LATHE ROLL
44" Hyde Park Double Roll Lathe, M.D. 33' Bed with head stock at each end 22" between centers

MILLING MACHINES—PLANER TYPE
30"x24"x12' Ingersoll Horizontal Inclined Rail Type Milling Machine, Motor Driven
48" Newton Horizontal Adjustable Rail Type Milling Machine, Motor Driven. 59" Between Housings. Table 42"x12'4" Between Pockets

MOTORS
400 HP General Electric, 2200/3/60, 514 RPM
500 HP General Electric, 2200/3/60, 1200 RPM
1000 HP Crocker-Wheeler Mill Type Motor, 2200/3/60, 300 RPM
1500 HP General Electric Mill Type Motor, 4600/3/60, 300 RPM

6500 LB.
ERIE BOARD DROP HAMMER

8000 LB. CHAMBERSBURG
DOUBLE LEG STEAM FORGING HAMMER

6000# CHAMBERSBURG
STEAM FORGING HAMMER
Double Frame — Guided Ram Type

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STEAM FORGING HAMMER
Double Frame

10' KLING PLATE BENDING ROLL
PYRAMID TYPE — DROP END HOUSING
Capacity ½" Plate
Top Roll 12" Dia. — Bottom Rolls 9" Dia.
Complete with 15 HP AC Motor

10' BERTSCH INITIAL TYPE PLATE
BENDING ROLL
Capacity 1¼" Plate
Drop End Housing
Motor Driven — Including D.C. Motor

PLANERS
72"x72"x12' Putnam Three Head, M.D.
96"x85"x18' Pond Four Head, M.D.
100"x84"x25' Pond Four Head, B.M.D.

PLATE DUPLICATORS
Thomas Plate Duplicator, Table and Punch. Capacity to Punch Plates 73" wide x 13'. Punch 1¼" thru 1"
Thomas Plate Duplicator, Table and Punch. Capacity to Punch Plates 73" wide x 20'. Punch 1¼" thru 1"

PRESS—EXTRUSION
600 ton Robertson, Arr. for Motor Drive

PRESSES—HYDRAULIC
300 ton Chambersburg Self-Contained Four Column Hydro-Pneumatic Press, 12" dia. of ram, 18" stroke, 49" Between Columns
3000 T. Wood Four Column Forging Press 36" dia. of ram, 24" Stroke, 22"x41" bet. Columns
3000 ton Southwark Forging Press 48" dia. of ram, 15" Stroke. 17"x7½" column to column

PRESS—STRAIGHT SIDE—SINGLE ACTING
No. 96F Toledo Double Crank, 12" Stroke, 124" Between Uprights

PRESS—TOGGLE DRAWING
No. 14 Bliss. Width Between Uprights 52". Stroke of Blankholder 18". Stroke of Plunger 26"

PRESS—MISCELLANEOUS
300 ton Southwark Hydraulic Shell Piercing Four Column Press. 41"x65" Between Columns, 48" Dia. Ram, 48" Stroke

PUNCHES—BEAM
No. 11-B Beatty Beam Punch, Arr. for M.D. Capacity four 1 1/16" holes through 1" mild steel; I-beams up to 24"; Angles, Channels, ARA Section and Plates up to 42" in Width
Kling Beam Punch & Coping Machine. Arr. for Motor Drive. Capacity to cope or notch 6" to 24" I-beams. Equipped to punch six ¾" holes in ½" plate

PUNCHES—MULTIPLE
No. 7 Hilles & Jones, Automatic Gag Drum Control. Cap. 40 13/16" holes thru 5/8" Plate. Eq. Thomas Spacing Table
No. 32 Williams & White with Thomas Spacing Table, M.D. Will handle 8' wide plate up to 30' long

PUNCH & SHEAR COMBINATIONS
No. 4 Hilles & Jones Double End, M.D. 48" Throat. Capacity Punch 1½". through 1". Each end of machine equipped with Lysholm Table
No. 6 Beatty Double End, M.D. 16" Throat. Capacity Punch 1" through 1"
No. 14 Williams & White, Single End. M.D. Equipped with Lysholm Table. Capacity Punch 1¼"x1" Throat 48"
Hilles & Jones Punch, Sle. End, M.D. Thr. 60". Cap. Punch 2" through 1½" with Lysholm Table
Type G Cleveland Single End, Arr. for M.D. 12" throat. Capacity Punch 2" through 1"
Lysholm Double End, M.D. 44" Throats. Capacity 1⅜" thru 7/8". All steel

ROLL—PLATE STRAIGHTENING
96" Newbold, Arr. for M.D. Nine 14" Dia. Rolls. Capacity 1¼" Plate

ROLLS—TAPER FORGING
No. 1 Ajax, Belt Driven
No. 3 Ajax, Arranged for Motor Drive

ROLLING MILLS
10"x9" Acme Four Stand Two High
10"x12" UE&F Single Stand Two High
12"x20" Philadelphia Single Stand Two High
14"x42" Garrison Single Stand Two High
16" Garrison Bar Mill, Two Stands Three High and One Stand Two High
16"x20" Waterbury Farrel Single Stand Two High
22"x28" Univ. Three High Mill complete installation including motor
30" Morgan Three High Billet Mill
36"x70" Rolling Mill Four Stand Three High, Complete with Pinion Stand, Pushers, Saws, Chargers, Straighteners, Tilting Tables, etc.
44" Blooming Mill, Consisting of Pinion Stand-Roller Table and Catcher Table

SAWS
No. 0 Ryerson Friction Saw, M.D. Capacity 8" I-Beams, 3" Square, 1" Round, 4"x4"x3/8" Angles, 8" Channels, 3½" Pipe
Wellman Seaver Hot Saw, Arr. for M.D. 72" Dia. Saw. Capacity 11½" Square Billets

SHEAR—ALLIGATOR
No. 5 Birdsboro High Knife Type, Motor Drive. Capacity 4" Square, 5" Round Cold

SHEARS—ANGLE
Long & &Allstatter Double Angle Shear, Arr. for M.D. Capacity 4"x4"x½"
Hilles & Jones No. 2 Double Angle Shear, Arr. for M.D. Cap. 6"x6"x¾"
Long & Allstatter Size C Double Angle Shear, Motor Driven. Cap. 8"x8"x1"

SHEARS—BAR
No. 3 Hilles & Jones Guillotine Type, Arr. for M.D. Capacity Shear, 3" Rounds, 2½" Square, 10"x1¼" Flats, 6"x6"x½" Angles
No. 10 Buffalo Armor Plate, Belt or Motor Drive. Capacity to shear, 3⅞" Rounds, 3½" Squares, 8"x1¼" Flats, 8"x8"x¾" Angles
74" UE&F Co. Bar Shear, Arr. for M.D. Capacity eight 8"x1¼" Bars. Complete with 70' Bar Shear Approach Table
Mesta Vertical Open Throat Bar Shear. M.D. 1¼"x36". Cap. to cut four 1¼"x8". Cold Soft Steel Sheet Bars. Complete with Tables

SHEARS—GATE
96" Hilles & Jones No. 6, Arr. for M.D. Capacity 7/8" Plate
132" Morgan Gate Shear, 7½" Stroke. Capacity 1¼" Plate
144" Hilles & Jones No. 7, Arr. for M.D. Capacity 1" Plate

SHEARS—HYDRAULIC
350 ton Morgan Three Cylinder Up Cut Hydraulic Shear. Capacity 10"x10" hot steel
900 ton Steam Hydraulic Shear. Complete with Intensifier & Gauge for cutting Slabs 12" min. to 16' max. Stroke 32"x8"

SHEARS—ROTARY
Newbold Double Rotary Shear. Knife Dia. 15". Max. Cut 100" Wide, Min. 18"
No. 40A Quickwork Rotary Shear, Arr. for Motor Drive. Capacity ½" Plate. Complete with Circle Cutting Attachment

SHEAR—ROTARY FLYING
United Engineering & Foundry Co., motor driven, 1" rounds up to 2"x¾" flats

SHEAR—SQUARING
96" Wais & Roos, Arr. for M.D. Cap. ¼"

STRAIGHTENERS
No. 0 Medart, Arr. for M.D. Timken Equipped. Capacity ¼" to 1½" dia. bars any length
⅜" Hallden No. 2 Straightening & Cut-off Machine. Arr. for M.D. 12' Cut-off
No. 2 Sutton-Abramson Straightener, M.D. Capacity Solid Bars 1¼" to 3½" dia., Tubes 1¼" to 4⅝" O.D.
⅜", 3/16", ¼", ½" Shuster Rotary Straightening and Cut-off Machines

TESTING MACHINES
4000 lb. Riehle Universal
60,000 lb. Southwark Emery Universal, M.D.
100,000 lb. Olsen Universal, Motor Driven
200,000 lb. Olsen Universal, Motor Driven

WIRE DRAWING MACHINE
Waterbury Farrel Model 1-7, Arr. for M.D. Capacity ¼" or 5/16" to .162 wire

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8" Bar Beaman & Smith Floor Type with Extra Swivel Table
5" Bar Niles Knee Type with Extra Circular Table
4" Bar Detrick & Harvey Floor Type with Extra Univ. Swivel & Tilt Table
2¼" Bar Lucas Table Type

BORING MILLS—Vertical
72" Colburn Heavy Duty P R T
72" N B P Heavy Duty P R T
42" Bullard, P R T
36" Bullard, Rapid Prod. Side Head
24" Bullard, Rapid Prod. Side Head

PLANERS
42"x42"x14' N B P 4 Heads
30"x30"x12' Whitcomb 2 Heads

MILLERS
37"x37"x14' Ingersoll Adj. Rail
32"x24"x 9' Ingersoll Adj. Rail
#5 C Brown & Sharpe Vertical M.D.
#4 Hendey Plain, Motor Drive

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28" Gould & Eberhardt M.D.
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46"x40' N B P	Heavy Duty M.D.
39"x14' N B P	Heavy Duty M.D.
36"x24' Bridgeford	Heavy Duty M.D.
36"x22' Bridgeford	Heavy Duty M.D.
36"x15' Putnam	Heavy Duty M.D.
28"x14' Lodge & Shipley	M.D.
27"x12' Greaves	Heavy Duty M.D.

MISCELLANEOUS
500 ton N B P Double Carwheel Press
60" Gould & Eberhardt Gear Cutter
#12 Barber-Colman Gear Cutter
2⅝" Gridley Four Spindle Type "G"

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3000 TOOLS IN STOCK

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GRINDER—Heald No. 20 Rot. Surf.
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MILLERS—Cincinnati, Nos. 1, 1½, 2 Univ.
MILLER—Kempsmith & B&S, No. 3 Univ.
MILLER—Cincinnati No. 38 Univ. S.P.D.
MILLER—Cincinnati No. 2 High Power Plain, S.P.D.
MILLER—Cincinnati No. 5 S.P.D. Plain
PRESSES—W-F30 Ton Cap. Rack & Pinion, 48" Stroke, For Shells
PRESSES—Bliss Nos. 204, 304 S.S.
PUNCH & SHEAR—New Doty No. 17G—48" Throat, Motor Drive, Single End
SCREW MACHINES—Gridley ⅞", 1¼", Model G
SCREW MACHINES—B. & S. Automatic, most sizes
SCREW MACHINES—Hand—most makes & sizes
SHAPER—G & E 24". M. D.
SHEAR—Niagara No. 410 Circle & Slitting
SHEAR—Stoll 10'x¼" Squaring
TAPPER—Threadnut No. 2 Auto Nut
TAPPER—Anderson No. 40
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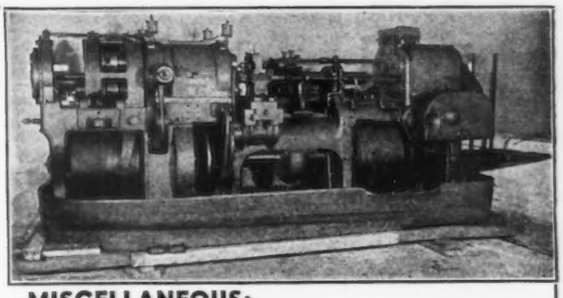
3" Model "B" 4-spindle National Acme Automatic.

3¾" Model "B" 4-spindle National Acme Automatic.

6—No. 6-A Potter & Johnson Automatic Turret Lathes



MISCELLANEOUS:

3—No. 00G Brown & Sharpe Automatics
2—Model "B" Turret Type Norton Grinders 4"x5"
2—No. 132 Arter Automatic Cylindrical Grinders
1—12"x36" Landis Plain Cylindrical Grinder
4—No. 4 Millholland Turret Lathe
1—30"x30"x18' Gray Planer, 2 heads
1—No. 13-C Natco Hydraulic Multiple Drill
1—No. 14 Natco Multiple Drill
2—No. 12 Brown & Sharpe Plain Grinders
2—No. 3 Cincinnati Plain Millers, Slotted S.N.
1—No. 221 General Flex. Hyd. Press—20 Ton
1—No. 6 Gardner M.D. Disc Grinder, 26" discs
1—No. 24 Gardner Horizontal Disc Grinder, 53" disc
1—Hutto 2-spindle Internal Honing Machine
1—No. 1B Cleveland S.E. Punch—36" throat
1—1½" Acme Upsetting & Heading Machine—steel head M.D.
1—8"x8"x1" Kling Double Angle Shear, M.D. on turntable
1—11' x 16 Ga. Stoll Square Shear
1—No. 20 Bryant Hole Grinder
3—Crankshaft Lathes—Wickes
50—Drills of all sizes

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Gear Hobbers, No. 2 Barber-Colman, bench type.
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Nipple Machine or drill, Langelier, semi-automatic, five-station, capacity up to ¼"; feed 1¼".

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ELYRIA, OHIO

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6"x32" Norton Plain Grinder, motor dr.
No. 4 Pratt & Whitney Vertical Miller & Die Sinker, table 18"x72", belt dr.
22"—46"x8' Putnam gap lathe, belt dr. quick change.
#42 Producto-Matic Milling Machine.
#2 Cincinnati Centerless Grinder, motor drive.
#3 Cincinnati Vertical Miller, table 13½"x55", W. S.

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4½" Bar, Niles-Bement-Pond Horizontal Duplex, with Motor 3/60 cy. Delivery about 60 days.
In Very Good Condition.

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48"x48"x18' Putnam Planer, 4 Heads.

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Ryerson Steel Construction, High Power Quintuple; Motor Driven, Capacity Shear Plates ½"; Punch ¾ thru ¾; Angles 6x4x½.

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1—No. 2 Cincinnati Grinder with three motors, Serial No. B403
1—No. 2112 Excello 2 spindle singleend Junior Precision Boring Machine
1—No. 13B Brown & Sharpe Milling Machine with motor
2—12HS Gould & Eberhardt Gear Hobbers with motors
2—16HS Gould & Eberhardt Gear Hobbers with motors
1—18 by 14 American Back Geared Engine Lathe, with countershaft

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750 ton Southwark triple action hydraulic toggle drawing. 142½" between uprights, 84" shut height, 550,000 lbs.

600 ton No. 664B Toledo coining, 40" between uprights.

No. 661 Toledo. 150 ton coining.

100 Ton French Oil Machinery Co., hydraulic press used for straightening castings.

108" No. 796¼D Toledo Double Crank Toggle Drawing.

96" No. 796¼C Toledo Double Crank Toggle Drawing.

No. 1½ Bliss Toggle Drawing.

No. 164 (173) Toledo Toggle Drawing.

No. DDG54 Ferracute, cam drawing.

48" No. 6A Bliss double crank. Tie rod frame, roll feed.

45" No. 151 Ferracute Double Crank.

28" No. 71 Swaine double crank. 23½" between uprights, double crank gap frame, flywheel drive.

No. 21½ Bliss Consolidated OBI.

No. 5-I Cleveland O.B.I.

Waterbury Farrell O.B.I. 4½" shaft.

No. 6 Bliss Consolidated O.B.I.

No. 6 Toledo O.B.I.

No. 10-I Cleveland O.B.I., 14,000 lbs.

No. 75 grd. Toledo, OB, non-incl.

No. 76 grd. Toledo OB., non-incl.

Waterbury Farrell OB., non-incl.

Fremont OB., non-incl.

No. P2 Ferracute.

No. EG35 Erie punching.

No. 94 Consolidated Punching.

Nos. 55, 55½, and 56 Toledo, Straight Side.

No. 55½ Toledo straight side with side shear.

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Federal Works Agency, Public Buildings Administration, Washington, D. C., Sept. 10, 1940. —Sealed proposals in duplicate will be publicly opened in this office at 1 P. M., Standard Time, Oct. 10, 1940, for construction of the U. S. P. O. at Portland, Conn. Upon application, one set of drawings and specifications will be supplied free to each general contractor interested in submitting a proposal. The above drawings and specifications MUST be returned to this office. Contractors requiring additional sets may obtain them by purchase from this office at a cost of $5 per set, which will not be returned. Checks offered as payment for drawings and specifications must be made payable to the order of the Treasurer, U. S. Drawings and specifications will not be furnished to contractors who have consistently failed to submit proposals. One set upon request, and when considered in the interests of the Government, will be furnished, in the discretion of the Commissioner, to builders' exchanges, chambers of commerce or other organizations who will guarantee to make them available for any sub-contractor or material firm interested, and to quantity surveyors, but this privilege will be withdrawn if the sets are not returned after they have accomplished their purpose. W. E. Reynolds, Commissioner of Public Buildings, Federal Works Agency.

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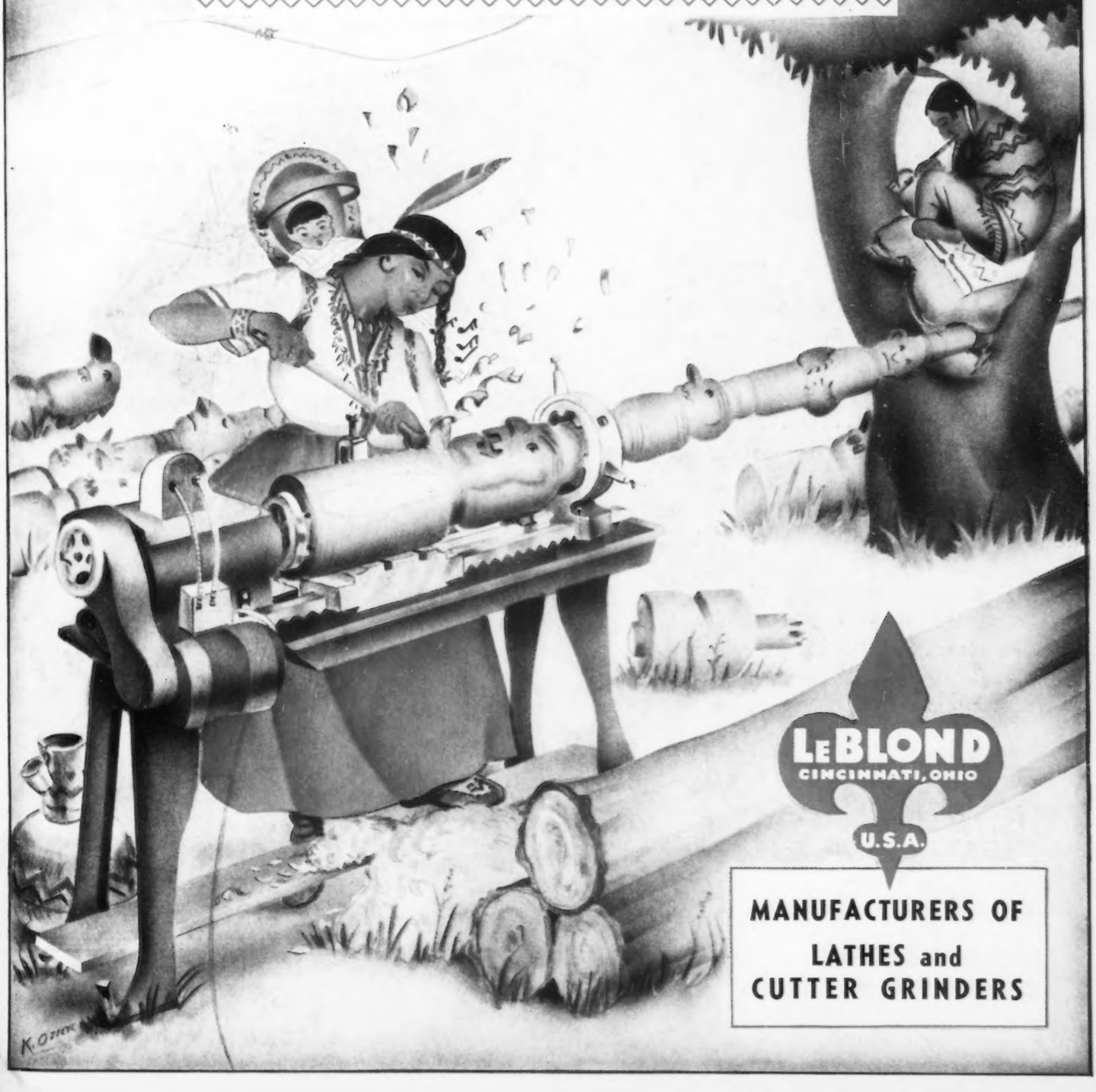

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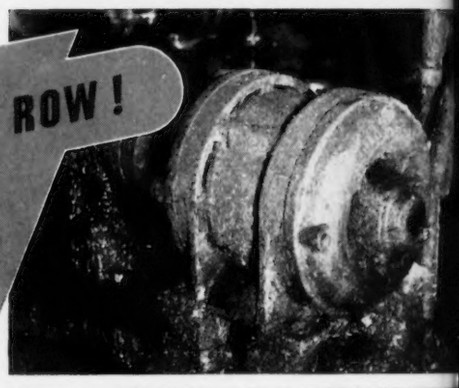

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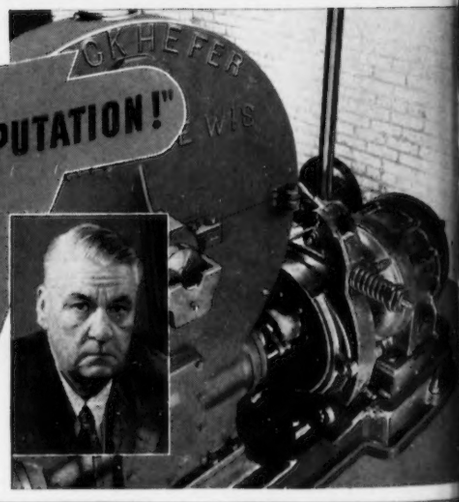

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